
Mixed-Signal and Analog Products

Designer's Guide and Reference

Mixed-Signal & Analog Products Designer's Guide & Reference

January 1999



How to use this document

This third edition of Texas Instruments Mixed-Signal & Analog Products Designer's Guide & Reference is designed to offer you the tools to quickly identify the most appropriate mixed-signal products for new designs. It is intended to supplement and index, but not to replace, a complete library of product databooks. It is important to note two other vital resources for product information: 1) the InfoNavigator CD-ROM (literature # SLYC005B), and 2) the **Semiconductor** products category at the TI WEB site www.ti.com.

New Product Previews

In the front of each section are New Product Previews showcasing products that are expected to release early 1999. Use the resources and contacts in Appendix A to reach us directly to discuss your needs.

Decision Trees

Most chapters are structured to guide you through the process of narrowing your choice of appropriate products based on your key careabouts and specifications. The table of contents for each section will direct you to the specific product category of interest—no need to dig for information. For example, in Chapter 1, Amplifiers are broken into categories like "low noise," "single-supply," "low voltage," etc. Once you start with these broader categories, the branches of the tree narrow your choice of devices by further qualifying the search criteria.

Selection Guides

Following each decision tree (or chart) is a table of specifications most appropriately associated with products in that category, sorted by the specification that best represents your chief concern. "Low Noise Op Amps," for example, are sorted by noise figure, from lowest to highest. Other specifications in these tables relate most to applications where these devices would be used. These Selection Guides let you quickly compare key specs to choose a single device, or devices, from among those segregated by the decision trees. From here you should refer to the individual product datasheets (listed in Appendix C) for complete specifications.

Ordering Guide

Appendix B provides a general ordering guide to help you identify device numbers for each product group. The package suffix options for a particular device can be located in Appendix C. With this information, the ordering guide helps you construct the full device part number.

Other Documentation and Contact Information

Appendix A includes a current list of databooks, applications notes and other literature, and evaluation modules. Contacts for ordering these documents or for technical assistance are also listed here. Appendix C includes a literature number for the technical document that covers each device. Two other resources for product information are: 1) the InfoNavigator CD-ROM (literature # SLYC005B), and 2) the **Semiconductor** products category at the TI WEB site www.ti.com.

Index

Appendix C is an index of Texas Instruments Mixed-Signal and Analog Products. The index will tell you the device family, what chapter to find it in, the literature number of the most current datasheet, and the package suffix options for each device. Package suffix definitions are in Appendix B. When you're looking for information about an unidentified device, this index is the place to start.

Samples and Literature

If you have questions or you want to order samples, request any of the literature in Appendix A or C, or order additional copies of this guide, see Contact Information in Appendix A.

For technical assistance, requesting datasheets or samples, see Contact Information in Appendix A.

Two other resources for product information are:

- 1) the InfoNavigator CD-ROM (literature # SLYC005B)**
- 2) the Semiconductor products category at the TI web site www.ti.com**

Important Notice: The products and services of Texas Instruments and its subsidiaries described herein are sold subject to TI's standard terms and conditions of sale. Customers are advised to obtain the most current and complete information about TI products and services before placing orders. TI assumes no liability for applications assistance, customer's applications or product designs, software performance, or infringement of patents. The publication of information regarding any other company's products or services does not constitute TI's approval, warranty or endorsement thereof.

1—Amplifiers & Comparators

AMPLIFIERS &
COMPARATORS

2—Data Converters

DATA
CONVERTERS

3—Data Transmission Products

DATA
TRANSMISSION
PRODUCTS

4—Power Supply Products

POWER
SUPPLY
PRODUCTS

5—Power Drivers

POWER
DRIVERS

6—Special Functions (Microcontrollers, Clock Drivers, Timers, PLLs)

SPECIAL
FUNCTIONS

Appendix

A—Resources & Contact Information

APPENDIX A
RESOURCES &
CONTACT INFO.

Appendix

B—Device Number Ordering Guide

APPENDIX B
DEVICE NUMBER
ORDERING GUIDE

Appendix

C—Device Index for Mixed-Signal & Analog Products

APPENDIX C
DEVICE INDEX

Amplifiers & Comparators

Contents

New Product Previews	1-2
-----------------------------------	-----

Product Decision Trees and Selection Guides

Amplifiers & Comparators Overview	1-3
General Purpose Op Amps	1-4
Performance Op Amps—Precision	1-8
Performance Op Amps—Low Noise	1-11
Performance Op Amps—Low Power	1-16
Performance Op Amps—Low Voltage	1-19
Performance Op Amps—Rail-to-Rail	1-22
Performance Op Amps—Single Supply	1-25
Audio Power Amplifiers	1-29
High-Speed Amplifiers	1-31
Comparators	1-33

For technical assistance, requesting datasheets or samples, see Contact Information in Appendix A.

Two other resources for product information are:

- 1) the InfoNavigator CD-ROM (literature # SLYC005B)**
- 2) the Semiconductor products category at the TI web site www.ti.com**

Amplifiers & Comparators New Product Previews

The following new devices are expected to be released in the near future. For more information, please refer to the InfoNavigator CD-ROM, literature number SLYC005B.

Device Description

Single Supply Op Amps

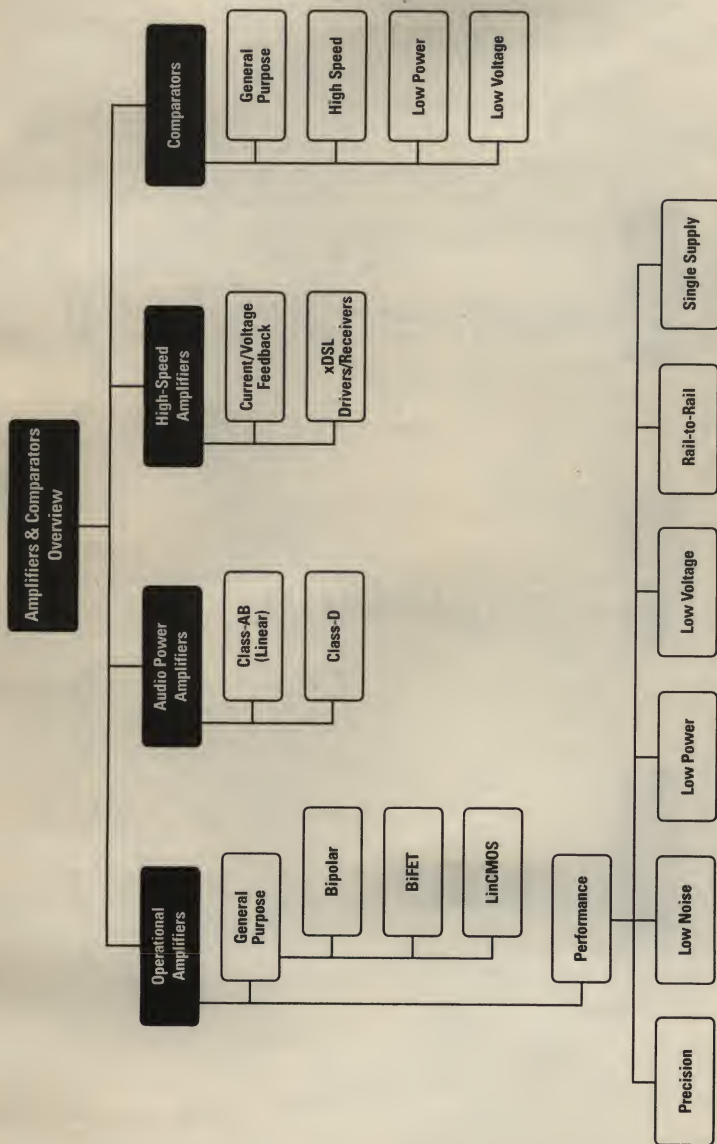
TLV2770	Single 2.7-V/5-V, 10.5-V/ μ s, 5.1-MHz RRO Op Amp with Shutdown
TLV2773	Dual 2.7-V/5-V, 10.5-V/ μ s, 5.1-MHz RRO Op Amp with Shutdown
TLV2774	Quad 2.7-V/5-V, 10.5-V/ μ s, 5.1-MHz RRO Op Amp
TLV2775	Quad 2.7-V/5-V, 10.5-V/ μ s, 5.1-MHz RRO Op Amp with Shutdown
TLV2450	Single 3-V/5-V, 23- μ A/ch, 290-kHz RRIO Op Amp with Shutdown
TLV2451	Single 3-V/5-V, 23- μ A/ch, 290-kHz RRIO Op Amp
TLV2452	Dual 3-V/5-V, 23- μ A/ch, 290-kHz RRIO Op Amp
TLV2453	Dual 3-V/5-V, 23- μ A/ch, 290-kHz RRIO Op Amp with Shutdown
TLV2454	Quad 3-V/5-V, 23- μ A/ch, 290-kHz RRIO Op Amp
TLV2455	Quad 3-V/5-V, 23- μ A/ch, 290-kHz RRIO Op Amp with Shutdown
TL343	Single (SOT-23) Low-Power Op Amp
TL3472	High-Slew-Rate, Single-Supply Op Amp

High Speed Op Amps

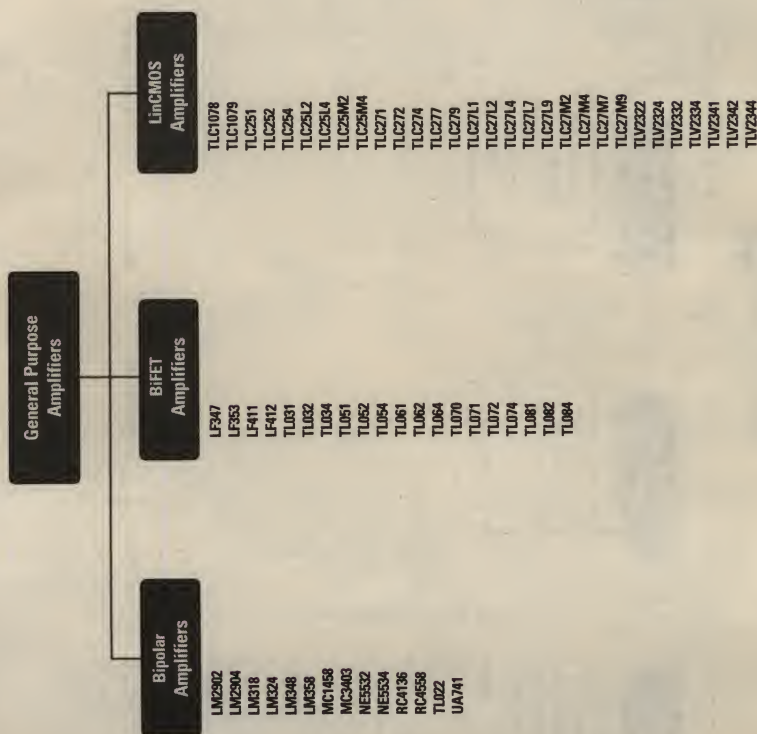
THS6022	250-mA Dual Differential Line Driver
THS6062	Low-Noise ADSL Dual Differential Receiver
THS7002	ADSL Receiver with Programmable Gain

Web Locations for Specific Product Groups

Amplifiers & Comparators	www.ti.com/sc/docs/msp/pran/default.htm
--------------------------	--



General Purpose Op Amps



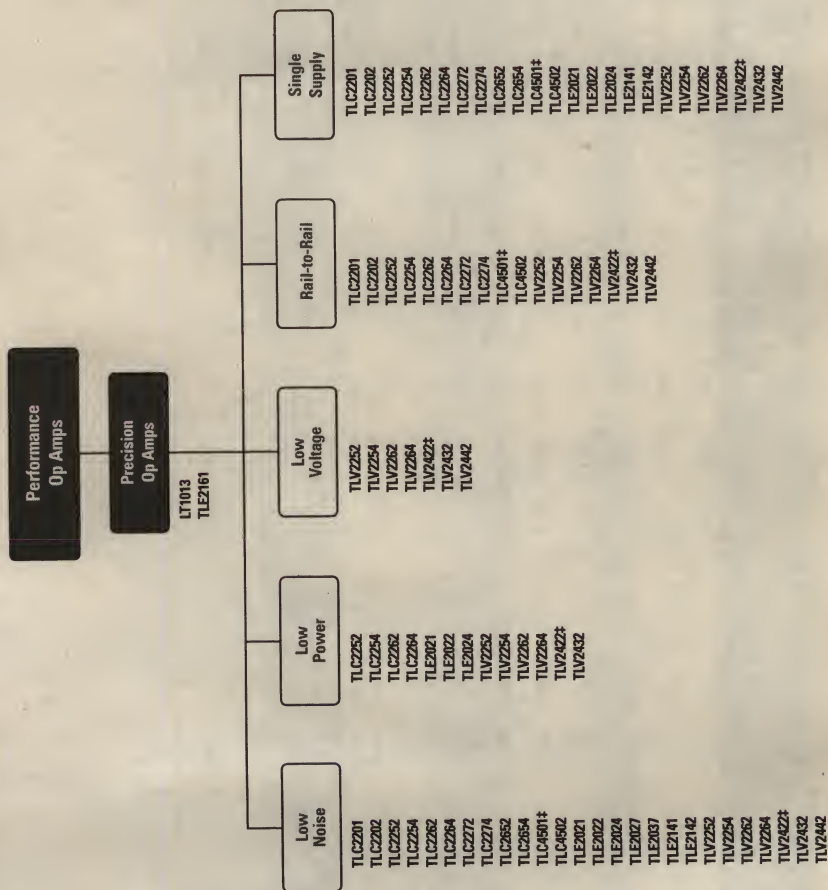
Device	V_{SD}/V_{OC} (V)	I_{SD}/I_{OC} (mA/channel)	V_O (mV)	I_{IB} (μ A)	CMRR (dB)	Slew Rate (V/ μ s)	GBW (MHz)	V_n (nV/ \sqrt{Hz})	Description			
Bipolar												
LM2902	4	26	0.175	0.3	3	7	-20	80	0.25	0.4	23	Quad General-Purpose
LM2904	4	26	0.5	1	3	7	-20	80	0.15	0.4	23	Dual General-Purpose
LM318	± 5	± 20	5	10	4	10	150	100	70	15	23	Single High-Speed
LM324	4	32	0.175	0.3	3	7	-20	80	0.25	0.4	23	Quad General-Purpose
LM348	± 4	± 18	0.6	1.125	1	6	30	90	0.5	1	23	Quad General-Purpose
LM358	4	32	0.5	1	2 to 3	3 to 7	-20	80	0.5	1	23	Dual General-Purpose
MC1458	± 5	± 15	1.7	2.8	1	6	80	90	0.5	1	45	Dual General-Purpose
MC3403	5	30	0.7	1.75	2	10	-200	90	0.6	1		Dual General-Purpose
NE5532	3	20	4	8	0.5	4	200	100	9	10	5	Quad Low-Noise High-Speed Audio
NE5534	3	20	4	8	0.5	4	500	100	13	10	3.5	Low-Noise High-Speed Audio
RC4136	± 5	± 18	1.25	2.825	0.5	6	140	90	1.7	3	8	Quad General-Purpose
RC4558	± 5	± 18	1.25	2.8	0.5	6	150	90	1.7	3	8	Dual General-Purpose
TL022	± 5	± 18	0.065	0.125	1	5	100	72		0.5	50	Dual Low-Power General-Purpose
UA741	± 3.5	± 18	1.7	2.8	1	6	80	90	0.5			General-Purpose
BIFET												
LF347	± 3.5	± 18	2	3.75	3 to 5	5 to 10	0.05	100	13	3	18	Quad General-Purpose JFET-Input
LF353	± 3.5	± 18	1.8	3.25	5	10	0.05	100	13	3	18	Dual General-Purpose JFET-Input
LF411	± 3.5	± 18	2	3.4	0.8	2	0.05	100	13	3	18	Precision JFET-Input
LF412	± 3.5	± 18	2.25	3.4	1	3	0.05	100	13	3	18	Dual JFET-Input
TL031	± 5	± 18	0.217	0.28	0.34 to 0.5	0.8 to 1.5	0.002	94	5.1	1.1	41	Enhanced JFET Low-Power Precision
TL032	± 5	± 18	0.111	0.28	0.39 to 0.57	0.8 to 1.5	0.002	94	5.1	1.1	41	Dual Enhanced JFET Low-Power Precision
TL034	± 5	± 18	0.2175	0.28	0.58 to 0.79	1.5 to 4	0.002	94	5.1	1.1	43	Quad Enhanced JFET Low-Power Precision
TL051	± 5	± 18	2.7	3.2	0.35 to 0.59	0.8 to 1.5	0.03	93	20	3.1	18	Enhanced JFET Precision
TL052	± 5	± 18	2.4	2.8	0.4 to 0.65	0.8 to 1.5	0.03	93	20.7	3	19	Dual Enhanced JFET Precision
TL054	± 5	± 18	2.1	2.8	0.5 to 0.56	1.5 to 4	0.03	92	17.8	2.7	21	Quad Enhanced JFET Precision
TL061	± 3.5	± 18	0.2	0.25	2 to 3	3 to 15	0.03	86	3.5	1	42	Low-Power JFET-Input General-Purpose
TL062	± 3.5	± 18	0.2	0.25	2 to 3	3 to 15	0.03	86	3.5	1	42	Dual Low-Power JFET-Input General-Purpose

General Purpose Op Amps (Continued)

Device	V_{SD}/V_{OC} (V)	I_{SD}/I_{CC} (mA/channel)	V_{OC} (mV)	I_{SD} (μ A)	CMRR (dB)	Slew Rate (V/ μ s)	GBW (MHz)	V_n (nV/ $\sqrt{\text{Hz}}$)	Description
BIFET (Continued)									
TL064	± 3.5	± 18	2 to 3	0.03	86	3.5	1	42	Quad Low-Power JFET-Input General-Purpose
TL070	± 3.5	± 18	3	0.065	100	13	3	18	Low-Noise JFET-Input Decompensated
TL071	± 3.5	± 18	2 to 3	0.065	100	13	3	18	Low-Noise JFET-Input General- Purpose
TL072	± 3.5	± 18	2 to 3	0.065	100	13	3	18	Dual Low-Noise JFET-Input General-Purpose
TL074	± 3.5	± 18	2 to 3	0.065	100	13	3	18	Quad Low-Noise JFET-Input General-Purpose
TL081	± 3.5	± 18	2 to 3	0.03	86	13	3	18	JFET-Input General-Purpose
TL082	± 3.5	± 18	2 to 3	0.03	86	13	3	18	Dual JFET-Input General-Purpose
TL084	± 3.5	± 18	2 to 3	0.03	86	13	3	18	Quad JFET-Input General-Purpose
LinCMOS									
TLC1078	1.4	16	0.017	0.16	0.45	0.006	95	0.032	Dual μ Power Precision Low-Voltage
TLC1079	1.4	16	0.017	0.19	0.85	0.006	95	0.032	Quad μ Power Precision Low-Voltage
TLC251	1.4	16	0.675	1.6	0.39 to 1.1	2 to 10	0.006	80	LinCMOSTM Programmable Low-Power
TLC252	1.4	16	0.7	1.6	0.29 to 1.1	2 to 10	0.006	80	Dual Low-Voltage
TLC254	1.4	16	0.775	1.8	0.34 to 1.1	2 to 10	0.006	80	Quad Low-Voltage
TLC2512	1.4	16	0.01	0.017	0.204 to 1.1	2 to 10	0.006	94	Dual μ Power Low-Voltage
TLC2514	1.4	16	0.01	0.017	0.24 to 1.1	2 to 10	0.006	94	Quad μ Power Low-Voltage
TLC25M2	1.4	16	0.105	0.28	0.22 to 1.1	2 to 10	0.006	91	Dual Low-Power Low-Voltage
TLC25M4	1.4	16	0.105	0.28	0.25 to 1.1	2 to 10	0.006	91	Quad Low-Power Low-Voltage
TLC271	3	16	0.675	1.6	0.34 to 1.1	2 to 10	0.006	80	LinCMOSTM Programmable Low-Power
TLC272	3	16	0.7	1.6	0.23 to 1.1	2 to 10	0.006	80	Dual Single Supply
TLC274	3	16	0.675	1.6	0.34 to 1.1	2 to 10	0.006	80	Quad Single Supply
TLC277	3	16	0.7	1.6	0.2	0.5	0.006	80	Dual Precision Single Supply
TLC279	3	16	0.675	1.6	0.32	0.9	0.006	80	Quad Precision Single Supply
TLC271.1	3	16	0.01	0.017	0.24 to 1.1	2 to 10	0.006	94	Single Precision Single Supply μ Power

General Purpose Op Amps (Continued)

Device	V_{OS} (mV)		I_{b1}/I_{b2} (mV/channel)		V_{IC} (mV)		I_{in} (μ A)		CMRR (dB)		Slew Rate (V/ μ s)		GBW (MHz)		V_A (mV/Hz)	Description
	max	min	max	min	max	min	max	min	typ	typ	typ	typ	typ			
LinCMOS (Continued)																
TLC27L2	3	16	0.01	0.017	0.9 to 1.1	5 to 10	0.0006	94	0.03	0.085	68	Dual Precision Single Supply μ Power				
TLC27L4	3	16	0.01	0.017	0.24 to 1.1	2 to 10	0.0006	94	0.03	0.085	70	Quad Precision Single Supply μ Power				
TLC27L7	3	16	0.01	0.017	0.17	0.5	0.0006	94	0.03	0.085	68	Dual Precision Single Supply μ Power				
TLC27L9	3	16	0.01	0.017	0.2	0.9	0.0006	94	0.03	0.085	70	Quad Precision Single Supply μ Power				
TLC27M2	3	16	0.105	0.28	0.22 to 1.1	2 to 10	0.0006	91	0.43	0.525	32	Dual Precision Single Supply Low-Power				
TLC27M4	3	16	0.105	0.28	0.25 to 1.1	2 to 10	0.0006	91	0.43	0.525	32	Quad Precision Single Supply Low-Power				
TLC27M7	3	16	0.105	0.28	0.185	0.5	0.0006	91	0.43	0.525	32	Dual Precision Single Supply Low-Power				
TLC27M9	3	16	0.105	0.28	0.21	0.9	0.0006	91	0.43	0.525	32	Quad Precision Single Supply Low-Power				
TLV2322	2	8	0.006	0.017	1.1	9	0.0006	88	0.02	0.027	68	Dual Low-Voltage μ Power				
TLV2324	2	8	0.006	0.017	1.1	10	0.0006	88	0.02	0.027	68	Quad Low-Voltage μ Power				
TLV2332	2	8	0.08	0.25	0.6	9	0.0006	92	0.38	0.3	32	Dual Low-Voltage Low-Power				
TLV2334	2	8	0.08	0.25	0.6	10	0.0006	92	0.38	0.3	32	Quad Low-Voltage Low-Power				
TLV2341	2	8	0.325	1.5	0.6	8	0.0006	78	2.1	0.79	25	Single LinCMOS Low-Voltage High-Speed				
TLV2342	2	8	0.325	1.5	0.6	9	0.0006	78	2.1	0.79	25	Dual LinCMOS Low-Voltage High-Speed				
TLV2344	2	8	0.325	1.5	1.1	10	0.0006	78	2.1	0.79	25	Quad LinCMOS Low-Voltage High-Speed				



† Devices released since 1997 Designer's Guide

Device	I_{q1} (μ A)		V_{OS}/N_{OS} (V)		I_{OS}/I_{OCC} (mA/channel)		I_{q2} (pA)	CMRR (dB)		Slew Rate (V/ μ s)		GBW (MHz)	V_{OS} (nV/Hz)	Description
	typ	max	min	max	typ	max		typ	typ	typ	typ			
TLC2652	0.5 to 0.6	1 to 3	± 1.9	± 8	1.5	2.4	4	140	3.1	1.9	23	Precision Chopper-Stabilized		
TLC2654	4 to 5	10 to 20	± 2.3	± 8	1.5	2.4	50	125	3.7	1.9	13	Low-Noise Chopper-Stabilized		
TLE2027	10 to 20	25 to 100	± 4	± 22	3.8	5.3	15000	131	2.8	13	2.5	Low-Noise Precision		
TLE2037	10 to 20	25 to 100	± 4	± 19	3.8	5.3	15000	131	7.5	50	2.5	Low-Noise High-Speed Precision		
TLC4501*	10	40 to 80	4	6	1	1.5	1	100	2.5	4.7	12	Decomp		
TLC4502*	10	50 to 100	4	6	2.5	3.5	1	100	2.5	4.7	12	Advanced LinEPIC Self-Calibrating (Self-Cal) Precision Single		
TLE2022	70 to 150	150 to 500	± 2	± 20	0.275	0.35	35000	106	0.65	2.8	15	Advanced LinEPIC Self-Calibrating Precision Dual		
TLC2201*	80 to 100	200 to 500	4.6	16	1	1.5	1	110	2.5	1.8	8	Dual Precision Low-Power Single Supply		
TLE2021	80 to 120	200 to 500	± 2	± 20	0.2	0.3	25000	115	0.65	2	15	Low Noise Precision Rail-to-Rail Output		
LT1013	60 to 250	250 to 950	4	44	0.32	0.5	-15000	114	0.4		22	Precision Low-Power Single Supply		
TLC2202*	80 to 100	500 to 1000	4.6	16	0.85	1.3	1	110	2.5	1.9	8	Dual Precision Low-Power Dual Low-Noise Precision Rail-to- Rail		
TLE2024	500 to 1000	± 2	± 20	0.2625	0.35	50000	102	0.7	2.8	15	Quad Precision Low-Power Single Supply			
TLE2161	300 to 600	500 to 3000	± 3.5	± 19	0.29	0.35	4	90	10	6.4	40	JFET-Input High-Output-Drive Low- Power Decoupled		
TLE2141	175 to 200	500 to 900	± 2	± 22	3.5	4.5	-700000	108	45	5.9	10.5	Low Noise High-Speed Precision Single Supply		
TLE2142	275 to 290	750 to 1200	± 2	± 22	3.45	4.5	-700000	108	45	5.9	10.5	Dual Low-Noise High-Speed Precision		
TLC2252*	200	850 to 1500	4.4	16	0.035	0.0625	1	83	0.12	0.2	19	Dual Rail-to-Rail μ Power		
TLC2254*	200	850 to 1500	4.4	16	0.035	0.0625	1	83	0.12	0.2	19	Quad Rail-to-Rail μ Power		
TLV2252*	200	850 to 1500	2.7	8	0.034	0.0625	1	75	0.1	0.187	19	Dual Rail-to-Rail Low-Voltage μ Power		
TLV2254*	200	850 to 1500	2.7	8	0.034	0.0625	1	75	0.1	0.187	19	Quad Rail-to-Rail Low-Voltage μ Power		

* Rail-to-rail output

† Devices released since 1997 Designer's Guide

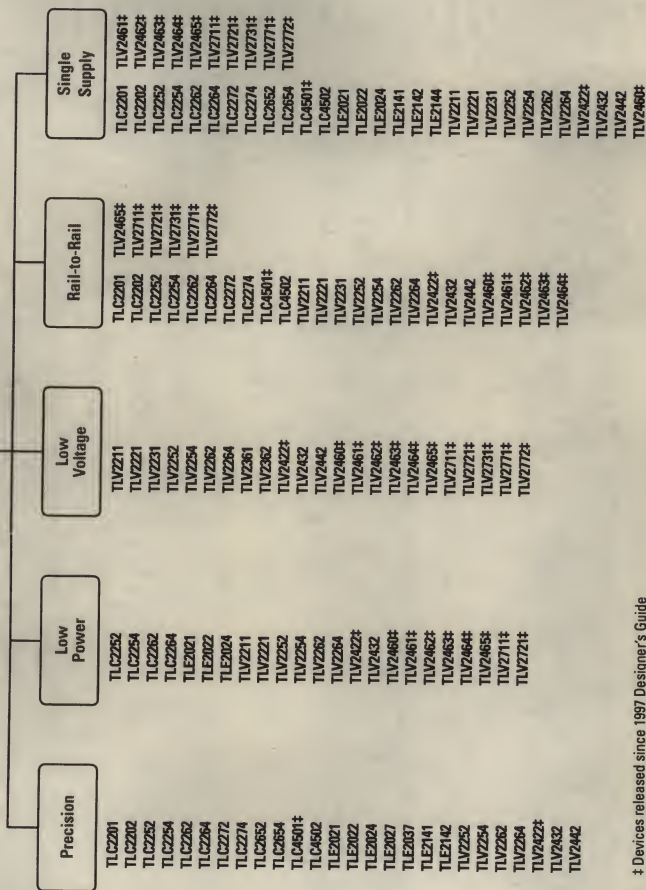
Performance Op Amps—Precision (Continued)

Device	V_{IO} (μ V)			V_{OS}/V_{CC} (V)		$I_{OP/CC}$ (mA/channel)		I_{IB} (pA)	CMRR (dB)	Slew Rate (V/ μ s)		GBW (MHz)		V_{IC} (nV/ \sqrt{Hz})		Description
	typ	max	min	max	min	typ	max			typ	typ	typ	typ	typ	typ	
TLC2272*	300	950 to 2500	4.4	16	4.4	1.1	1.5	1	75	3.6	2.18	9	2.18	9		Dual Low-Noise Rail-to-Rail
TLC2274*	300	950 to 2500	4.4	16	4.4	1.1	1.5	1	75	3.6	2.18	9	2.18	9		Quad Low-Noise Rail-to-Rail
TLC2282*	300	950 to 2500	4.4	16	4.4	0.2	0.25	1	83	0.55	0.82	12	0.82	12		Dual Advanced LinCMOS™ Rail-to-Rail
TLC2264*	300	950 to 2500	4.4	16	4.4	0.2	0.25	1	83	0.55	0.82	12	0.82	12		Quad Advanced LinCMOS Rail-to-Rail
TLV2282*	300	950 to 2500	2.7	8	2.7	0.2	0.25	1	75	0.55	0.67	12	0.67	12		Dual Rail-to-Rail Low-Voltage Low-Power
TLV2264*	300	950 to 2500	2.7	8	2.7	0.2	0.25	1	75	0.55	0.67	12	0.67	12		Quad Rail-to-Rail Low-Voltage Low-Power
TLV2422*‡	300	950 to 2000	2.7	10	2.7	0.05	0.075	1	90	0.02	0.052	18	0.052	18		Advanced LinCMOS Rail-to-Rail Output Wide-Input-Voltage Dual
TLV2442*	300	950 to 2000	2.7	10	2.7	0.75	1.1	1	75	1.3	1.75	18	1.75	18		Advanced LinCMOS Rail-to-Rail Output Wide-Input-Voltage Dual
TLV2432*	300	950 to 2000	2.7	10	2.7	0.098	0.125	1	83	0.25	0.5	22	0.5	22		Advanced LinCMOS Rail-to-Rail Output Wide-Input-Voltage Dual

* Rail-to-rail output

‡ Devices released since 1997 Designer's Guide

Low Noise Op Amps



† Devices released since 1997 Designer's Guide

Performance Op Amps—Low Noise

Device	V_n (nV/√Hz)	V_{os}/V_{CC} (V)	$I_{quiescent}$ (mA/channel)	V_{CC} (μV)	I_a (pA)	CMRR (dB)	Slow Rate (V/μs)	GBW (MHz)	Description
	typ	min	max	typ	max	typ	typ	typ	
TLE2027	2.5	±4	±22	10 to 20	25 to 100	131	2.8	13	Low-Noise Precision
TLE2037	2.5	±4	±19	10 to 20	25 to 100	131	7.5	50	Low-Noise High-Speed Precision Decomp.
TLE2227	2.5	±4	±19	100	350	115	2.5	13	Dual Low-Noise High-Speed Precision
TLE2237	2.5	±4	±22	100	350	115	5	50	Dual Low-Noise High-Speed Precision Decompensated
TLC2201*	8	4.6	16	80 to 100	200 to 500	110	2.5	1.8	Low Noise Precision Rail-to-Rail Output
TLC2202*	8	4.6	16	80 to 100	500 to 1000	110	2.5	1.9	Dual Low-Noise Precision Rail-to-Rail
TLV2361	8	±1	±2.5	1000	6000	85	3	7	Single High-Performance, Low-Voltage
TLC2272*	9	4.4	16	300	950 to 2500	75	3.6	2.18	Dual Low-Noise Rail-to-Rail
TLC2274*	9	4.4	16	300	950 to 2500	75	3.6	2.18	Quad Low-Noise Rail-to-Rail
TLV2362	9	±1	±3.5	1000	6000	75	2.5	6	Dual High-Performance, Low-Voltage
TLE2141	10.5	±2	±22	175 to 200	500 to 900	108	45	5.9	Low Noise High-Speed Precision Single Supply
TLE2142	10.5	±2	±22	275 to 290	750 to 1200	108	45	5.9	Dual Low-Noise High-Speed Precision
TLE2144	10.5	±2	±22	500 to 600	1500 to 2400	108	45	5.9	Quad Low-Noise High-Speed Precision
TLV2460††	11	2.7	6	100	2000	80	1.8	4.4	Single Low Power, Rail-to-Rail Input/Output
TLV2461††	11	2.7	6	100	2000	80	1.8	4.4	Single Low Power, Rail-to-Rail Input/Output

* Rail-to-rail output

† Rail-to-rail input and output

‡ Devices released since 1997 Designer's Guide

Performance Op Amps—Low Noise (Continued)

Device	V_n (nV/√Hz) typ	V_{os}/V_{CC} (V) min	V_{os}/V_{CC} (V) max	I_{sp}/I_{CC} (mA/channel) typ	I_{sp}/I_{CC} (mA/channel) max	V_{IC} (μV) typ	V_{IC} (μV) max	I_{ip} (pA) typ	CMRR (dB) typ	Slew Rate (V/μs) typ	GBW (MHz) typ	Description
TLV2462†‡	11	2.7	6	0.5	0.575	100	2000	4400	80	1.8	4.4	Dual Low-Power, Rail-to-Rail Input/Output
TLV2463†‡	11	2.7	6	0.5	0.575	100	2000	4400	80	1.8	4.4	Dual Low-Power, Rail-to-Rail Input/Output
TLV2464†‡	11	2.7	6	0.5	0.575	100	2000	4400	80	1.8	4.4	Quad Low Power, Rail-to-Rail Input/Output
TLV2465†‡	11	2.7	6	0.5	0.575	100	2000	4400	80	1.8	4.4	Quad Low Power, Rail-to-Rail Input/Output
TLE2071	11.6	±2.25	±19	1.7	2.2	470 to 490	2000 to 4000	20	98	45	10	Low-Noise High-Speed JFET-Input
TLE2074	11.6	±2.25	±19	1.425	1.875	-1600 to -500	3000 to 5000	25	98	45	10	Quad Low-Noise High-Speed JFET-Input
TLE2081	11.6	±2.25	±19	1.7	2.2	470 to 490	3000 to 6000	20	98	45	10	High-Speed JFET-Input
TLE2072	11.6	±2.25	±19	1.55	1.8	700 to 1100	3500 to 6000	20	98	45	10	Dual Low-Noise High-Speed JFET-Input
TLE2082	11.6	±2.25	±19	1.55	1.8	700 to 1100	4000 to 7000	20	98	45	10	Dual High-Speed JFET-Input
TLE2084	11.6	±2.25	±19	1.625	1.875	-1600 to -500	4000 to 7000	25	98	45	10	Quad High-Speed JFET-Input
TLC4501*‡	12	4	6	1	1.5	10	40 to 80	1	100	2.5	4.7	Advanced LinEPIC Self-Calibrating (Self-Cal) Precision Single Calibrating Precision Dual
TLC4502*	12	4	6	2.5	3.5	10	50 to 100	1	100	2.5	4.7	Advanced LinEPIC Self-Calibrating Precision Dual
TLC2262*	12	4.4	16	0.2	0.25	300	950 to 2500	1	83	0.55	0.82	Dual Advanced LinCMOS™ Rail-to-Rail
TLC2264*	12	4.4	16	0.2	0.25	300	950 to 2500	1	83	0.55	0.82	Quad Advanced LinCMOS Rail-to-Rail
TLV2262*	12	2.7	8	0.2	0.25	300	950 to 2500	1	75	0.55	0.67	Dual Rail-to-Rail Low-Voltage Low-Power

* Rail-to-rail output

† Rail-to-rail input and output

‡ Devices released since 1987 Designer's Guide

Performance Op Amps—Low Noise (Continued)

Device	R_{eq} (mV/√Hz)	V_{OS} (mV)	I_{noise} (nA/√Hz)	V_{OS} (μV)	I_{noise} (nA)	I_{CMR} (nA)	GBW (MHz)	Description
	typ	max	typ	max	typ	typ	typ	
TLV2264*	12	2.7	8	0.2	0.25	300	950 to 2500	Quad Rail-to-Rail Low-Voltage Low-Power
TLC2654	13	±2.3	±8	1.5	2.4	4 to 5	10 to 20	Low-Noise Chopper-Stabilized
TLE2022	15	±2	±20	0.275	0.35	70 to 150	150 to 500	Dual Precision Low-Power Single Supply
TLE2021	15	±2	±20	0.2	0.3	80 to 120	200 to 500	Precision Low-Power Single Supply
TLE2024	15	±2	±20	0.2625	0.35	500 to 1000	5000	Quad Precision Low-Power Single Supply
TLV2231*	15	2.7	10	0.85	1.2	710	3000	Single LinCMOS Rail-to-Rail μPower
TLV2731†	15	2.7	10	0.85	1.3	710	3000	Single LinCMOS Rail-to-Rail Low-Power
TLV2771†	17	2.5	5.5	1	2	360	1600 to 2500	Single 2.7-V High-Slew-Rate Rail-to-Rail Output
TLV2772†	17	2.5	5.5	1	2	360	1600 to 2500	Dual 2.7-V High-Slew-Rate Rail-to-Rail Output
TLV2422*†	18	2.7	10	0.05	0.075	300	950 to 2000	Advanced LinCMOS Rail-to-Rail Output Wide-Input Voltage Dual
TLV2442*	18	2.7	10	0.75	1.1	300	950 to 2000	Advanced LinCMOS Rail-to-Rail Output Wide-Input Voltage Dual
TLC2252*	19	4.4	16	0.035	0.0625	200	850 to 1500	Dual Rail-to-Rail μPower
TLC2254*	19	4.4	16	0.035	0.0625	200	850 to 1500	Quad Rail-to-Rail μPower
TLV2252*	19	2.7	8	0.034	0.0625	200	850 to 1500	Dual Rail-to-Rail Low-Voltage μPower
TLV2254*	19	2.7	8	0.034	0.0625	200	850 to 1500	Quad Rail-to-Rail Low-Voltage μPower

* Rail-to-rail output

† Rail-to-rail input and output

‡ Devices released since 1987 Designer's Guide

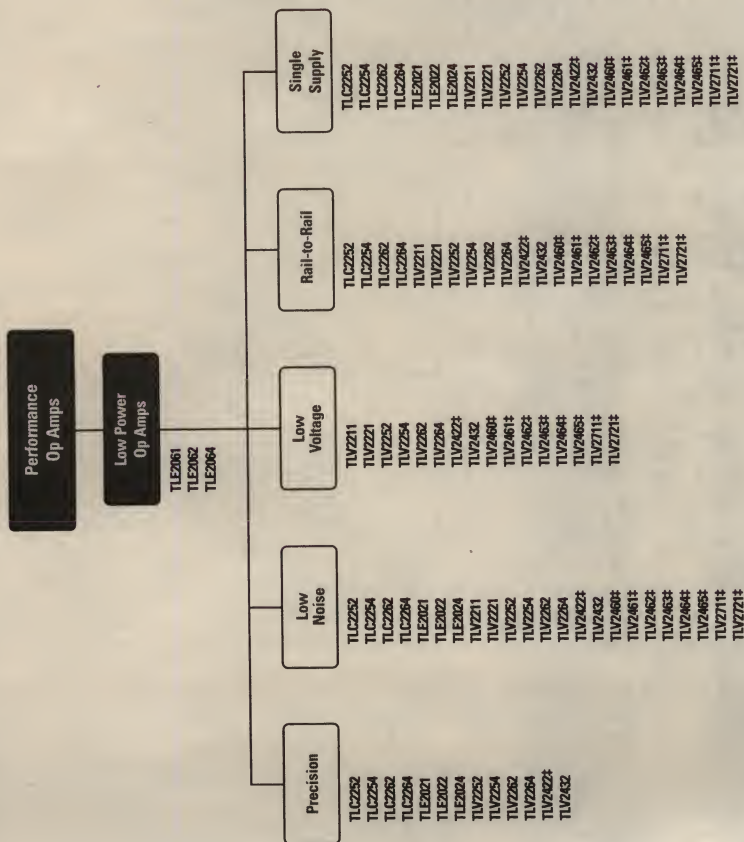
Performance Op Amps—Low Noise (Continued)

Device	V_n (nV/√Hz) typ	V_{op}/N_{cc} (V) min	V_{op}/N_{cc} (V) max	I_{Q1}/I_{Q2} (mA/ch/terminal) typ	I_{Q1}/I_{Q2} (mA/ch/terminal) max	V_{io} (μV) typ	V_{io} (μV) max	I_{th} (pA) typ	CMRR (dB) typ	Slow Rate (V/μs) typ	GBW (MHz) typ	Description
TLV2221*	19	2.7	10	0.11	0.15	610	3000	1	85	0.18	0.51	Single LinCMOS Rail-to-Rail μPower
TLV2721†‡	19	2.7	10	0.11	0.15	610	3000	1	85	0.18	0.51	Single LinCMOS Rail-to-Rail Very Low-Power
TLV2711‡	21	2.7	10	0.013	0.025	450	3000	1	83	0.025	0.065	Single LinCMOS Rail-to-Rail μPower
TLV2432*	22	2.7	10	0.098	0.125	300	950 to 2000	1	83	0.25	0.5	Advanced LinCMOS Rail-to-Rail Output Wide-Input-Voltage Dual
TLV2211*	22	2.7	10	0.013	0.025	450	3000	1	83	0.025	0.065	Single LinCMOS Rail-to-Rail μPower
TLC2652	23	±1.9	±8	1.5	2.4	.5 to .6	1 to 3	4	140	3.1	1.9	Precision Chopper-Stabilized

* Rail-to-rail output

† Rail-to-rail input and output

‡ Devices released since 1997 Designer's Guide



* Devices released since 1997 Designer's Guide

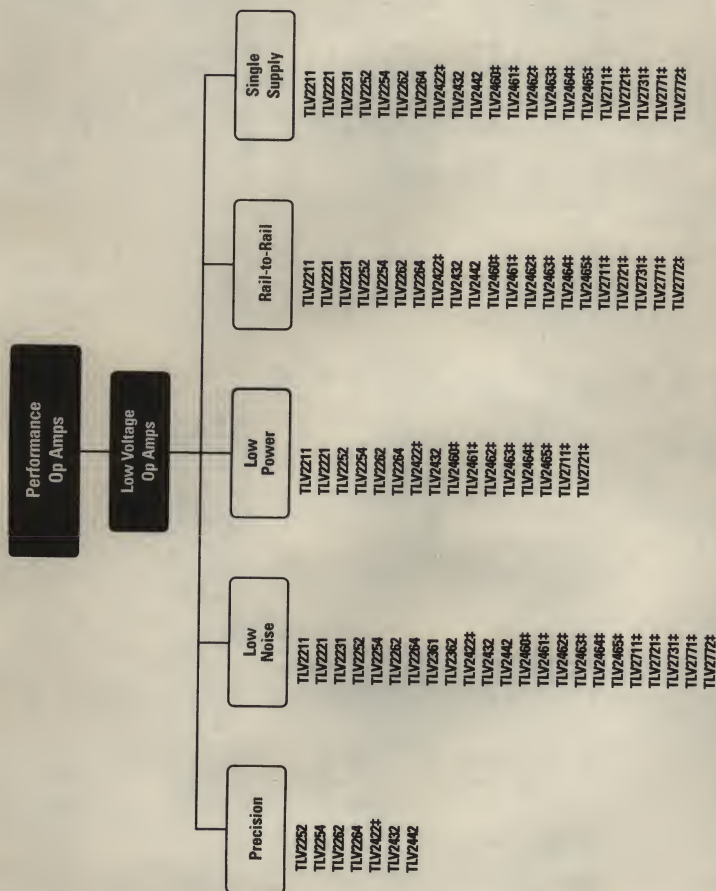
Performance Op Amps—Low Power

Device	I_{OQ}/I_{CC} (mA/Channel)		V_{DD}/V_{CC} (V)		V_{IO} (μ V)		I_{IB} (pA)	CMRR (dB)	Slew Rate (V/ μ s)	GBW (MHz)	V_n (nV/ \sqrt{Hz})	Description
	typ	max	min	max	typ	max	typ	typ	typ	typ	typ	
TLV2711†	0.013	0.025	2.7	10	450	3000	1	83	0.025	0.065	21	Single LinCMOS Rail-to-Rail μ Power
TLV2211*	0.013	0.025	2.7	10	450	3000	1	83	0.025	0.065	22	Single LinCMOS Rail-to-Rail μ Power
TLV2252*	0.034	0.0625	2.7	8	200	850 to 1500	1	75	0.1	0.187	19	Dual Rail-to-Rail Low-Voltage μ Power
TLV2254*	0.034	0.0625	2.7	8	200	850 to 1500	1	75	0.1	0.187	19	Quad Rail-to-Rail Low-Voltage μ Power
TLC2252*	0.035	0.0625	4.4	16	200	850 to 1500	1	83	0.12	0.2	19	Dual Rail-to-Rail μ Power
TLC2254*	0.035	0.0625	4.4	16	200	850 to 1500	1	83	0.12	0.2	19	Quad Rail-to-Rail μ Power
TLV2422†	0.05	0.075	2.7	10	300	950 to 2000	1	90	0.02	0.052	18	Advanced LinCMOS Rail-to-Rail Output Wide-Input-Voltage Dual μ Power
TLV2432*	0.098	0.125	2.7	10	300	950 to 2000	1	83	0.25	0.5	22	Advanced LinCMOS Rail-to-Rail Output Wide-Input-Voltage Dual μ Power
TLV2221*	0.110	0.150	2.7	10	610	3000	1	85	0.18	0.51	19	Single LinCMOS Rail-to-Rail μ Power
TLV2721†	0.110	0.150	2.7	10	610	3000	1	85	0.18	0.51	19	Single LinCMOS Rail-to-Rail Very Low-Power
TLV2262*	0.2	0.25	2.7	8	300	950 to 2500	1	75	0.55	0.67	12	Dual Rail-to-Rail Low-Voltage Low-Power
TLV2264*	0.2	0.25	2.7	8	300	950 to 2500	1	75	0.55	0.67	12	Quad Rail-to-Rail Low-Voltage Low-Power
TLC2262*	0.2	0.25	4.4	16	300	950 to 2500	1	83	0.55	0.82	12	Dual Advanced LinCMOS Rail-to-Rail
TLC2264*	0.2	0.25	4.4	16	300	950 to 2500	1	83	0.55	0.82	12	Quad Advanced LinCMOS Rail-to-Rail
TLE2021	0.2	0.3	±2	±20	80 to 120	200 to 500	25000	115	0.65	2	15	Precision Low-Power Single Supply
TLE2024	0.2625	0.35	±2	±20	500 to 1000	5000	50000	102	0.7	2.8	15	Quad Precision Low-Power Single Supply
TLE2022	0.275	0.35	±2	±20	70 to 150	150 to 500	35000	106	0.65	2.8	15	Dual Precision Low-Power Single Supply
TLE2061	0.29	0.35	±3.5	±19	300 to 600	500 to 3000	4	90	3.4	2	40	JFET-Input High-Output-Drive μ Power

* Rail-to-rail output

† Rail-to-rail input and output

‡ Devices released since 1987 Designer's Guide



† Devices released since 1987 Designer's Guide

Performance Op Amps—Low Voltage

Device	V_{GS}/N_{OC} (V)	I_{OP}/I_{CC} (mA/channel)	V_{IC} (μ V)	I_{IB} (pA)	CMRR (dB)	Slew Rate (V/ μ s)	GBW (MHz)	V_n (nV/ \sqrt{Hz})	Description
TLV2362	± 1	± 3.5	1000	20000	75	2.5	6	9	Dual High-Performance, Low-Voltage
TLV2361	± 1	± 2.5	1000	20000	85	3.0	7	8	Single High-Performance, Low-Voltage
TLV2771*†	2.5	5.5	360	2	96	10.5	5.1	17	Single 2.7-V High-Slew-Rate Rail-to-Rail Output
TLV2772*†	2.5	5.5	360	2	96	10.5	5.1	17	Dual 2.7-V High-Slew-Rate Rail-to-Rail Output
TLV2211*	2.7	10	450	1	83	0.025	0.065	22	Single LinCMOS Rail-to-Rail μ Power
TLV2711*†	2.7	10	450	1	83	0.025	0.065	21	Single LinCMOS Rail-to-Rail μ Power
TLV2252*	2.7	8	200	1	75	0.1	0.187	19	Dual Rail-to-Rail Low-Voltage μ Power
TLV2254*	2.7	8	200	1	75	0.1	0.187	19	Quad Rail-to-Rail Low-Voltage μ Power
TLV2422*†	2.7	10	300	1	90	0.02	0.052	18	Advanced LinCMOS Rail-to-Rail Output Wide-Input-Voltage Dual
TLV2432*	2.7	10	300	1	83	0.25	0.5	22	Advanced LinCMOS Rail-to-Rail Output Wide-Input-Voltage Dual
TLV2221*	2.7	10	610	1	85	0.18	0.51	19	Single LinCMOS Rail-to-Rail μ Power
TLV2721*†	2.7	10	610	1	85	0.18	0.51	19	Single LinCMOS Rail-to-Rail Very Low-Power
TLV2262*	2.7	8	300	1	75	0.55	0.67	12	Dual Rail-to-Rail Low-Voltage Low Power
TLV2264*	2.7	8	300	1	75	0.55	0.67	12	Quad Rail-to-Rail Low-Voltage Low Power
TLV2460†	2.7	6	100	4400	80	1.8	4.4	11	Single Low Power, Rail-to-Rail Input/Output
TLV2461†	2.7	6	100	4400	80	1.8	4.4	11	Single Low Power, Rail-to-Rail Input/Output
TLV2462†	2.7	6	100	4400	80	1.8	4.4	11	Dual Low-Power, Rail-to-Rail Input/Output
TLV2463†	2.7	6	100	4400	80	1.8	4.4	11	Dual Low-Power, Rail-to-Rail Input/Output
TLV2464†	2.7	6	100	4400	80	1.8	4.4	11	Quad Low Power, Rail-to-Rail Input/Output

* Rail-to-rail output

† Rail-to-rail input and output

‡ Devices released since 1997 Designer's Guide

Performance Op Amps—Low Voltage (Continued)

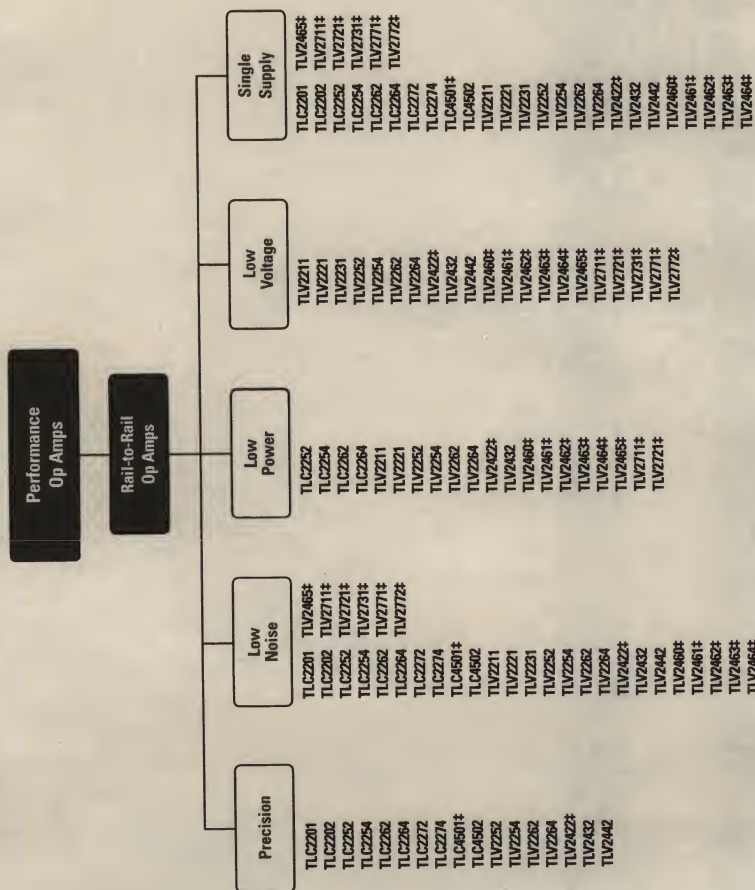
Dev. #	V_{EE}/V_{CC} (V)		I_{Q}/I_{OS} (mA/αA)		V_{IO} (μV)		I_{IS} (pA)		CMRR (dB)		Slew Rate (V/μs)		GBW (MHz)		V_n (nV/√Hz)		Description
	min	max	typ	max	typ	max	typ	max	typ	max	typ	max	typ	max	typ	max	
TLV2465†‡	2.7	6	0.5	0.575	100	2000	4400	80	1.8	4.4	11	Quad Low Power, Rail-to-Rail Input/Output					
TLV2442*	2.7	10	0.75	1.1	300	950 to 2000	1	75	1.3	1.75	18	Advanced LinCMOS Rail-to-Rail Output Wide-Input-Voltage Dual					
TLV2231*	2.7	10	0.850	1.200	710	3000	1	70	1.6	2	15	Single LinCMOS Rail-to-Rail μPower					
TLV2731*‡	2.7	10	0.85	1.300	710	3000	1	70	1.6	2	15	Single LinCMOS Rail-to-Rail Low-Power					

* Rail-to-rail output

† Rail-to-rail input and output

‡ Devices released since 1997 Designer's Guide

Performance Op Amps—Rail-to-Rail



† Devices released since 1997 Designer's Guide

Performance Op Amps—Rail-to-Rail

Device	V _{DD} (V)	I _{DD} (mA)	V _{DD} Max (V)	I _{DD} Max (mA)	I _{DD} Typ (mA)	I _{DD} Max (mA)	I _{DD} Typ (mA)	C _{int} (pF)	ESD rate (V/ps)	V _{th} (mV)	Description	
TLV2771†	360	1600 to 2500	2.5	5.5	1	2	2	96	10.5	5.1	17	Single 2.7-V High-Slew-Rate Rail-to-Rail Output
TLV2772†	360	1600 to 2500	2.5	5.5	1	2	2	96	10.5	5.1	17	Dual 2.7-V High-Slew-Rate Rail-to-Rail Output
TLV2211*	450	3000	2.7	10	0.013	0.025	1	83	0.025	0.065	22	Single LinCMOS Rail-to-Rail μ Power
TLV2711†	450	3000	2.7	10	0.013	0.025	1	83	0.025	0.065	21	Single LinCMOS Rail-to-Rail μ Power
TLV2252*	200	850 to 1500	2.7	8	0.034	0.0625	1	75	0.1	0.187	19	Dual Rail-to-Rail Low-Voltage μ Power
TLV2254*	200	850 to 1500	2.7	8	0.034	0.0625	1	75	0.1	0.187	19	Quad Rail-to-Rail Low-Voltage μ Power
TLV2422†	300	950 to 2000	2.7	10	0.05	0.075	1	90	0.02	0.052	18	Advanced LinCMOS Rail-to-Rail Output
TLV2432*	300	950 to 2000	2.7	10	0.098	0.125	1	83	0.25	0.5	22	Wide-Input-Voltage Dual Advanced LinCMOS Rail-to-Rail Output
TLV2221*	610	3000	2.7	10	0.110	0.150	1	85	0.18	0.51	19	Single LinCMOS Rail-to-Rail μ Power
TLV2721†	610	3000	2.7	10	0.110	0.150	1	85	0.18	0.51	19	Single LinCMOS Rail-to-Rail Very Low-Power
TLV2262*	300	950 to 2500	2.7	8	0.2	0.25	1	75	0.55	0.67	12	Dual Rail-to-Rail Low-Voltage Low-Power
TLV2264*	300	950 to 2500	2.7	8	0.2	0.25	1	75	0.55	0.67	12	Quad Rail-to-Rail Low-Voltage Low-Power
TLV2460†	100	2000	2.7	6	0.5	0.575	4400	80	1.8	4.4	11	Single Low-Power, Rail-to-Rail Input/Output
TLV2461†	100	2000	2.7	6	0.5	0.575	4400	80	1.8	4.4	11	Single Low-Power, Rail-to-Rail Input/Output
TLV2462†	100	2000	2.7	6	0.5	0.575	4400	80	1.8	4.4	11	Dual Low-Power, Rail-to-Rail Input/Output
TLV2463†	100	2000	2.7	6	0.5	0.575	4400	80	1.8	4.4	11	Dual Low-Power, Rail-to-Rail Input/Output
TLV2464†	100	2000	2.7	6	0.5	0.575	4400	80	1.8	4.4	11	Quad Low-Power, Rail-to-Rail Input/Output
TLV2465†	100	2000	2.7	6	0.5	0.575	4400	80	1.8	4.4	11	Quad Low-Power, Rail-to-Rail Input/Output
TLV2442*	300	950 to 2000	2.7	10	0.75	1.1	1	75	1.3	1.75	18	Advanced LinCMOS Rail-to-Rail Output Wide-Input-Voltage Dual
TLV2231*	710	3000	2.7	10	0.850	1.200	1	70	1.6	2	15	Single LinCMOS Rail-to-Rail μ Power
TLV2731†	710	3000	2.7	10	0.85	1.300	1	70	1.6	2	15	Single LinCMOS Rail-to-Rail Low-Power
TLC4501†	10	40 to 80	4	6	1	1.5	1	100	2.5	4.7	12	Advanced LinEPIC Self-Calibrating (Self-Cal) Precision Single
TLC4502*	10	50 to 100	4	6	2.5	3.5	1	100	2.5	4.7	12	Advanced LinEPIC Self-Calibrating Precision Dual
TLC2252*	200	850 to 1500	4.4	16	0.035	0.0625	1	83	0.12	0.2	19	Dual Rail-to-Rail μ Power

* Rail-to-rail output
† Rail-to-rail input and output
‡ Devices released since 1997 Designer's Guide

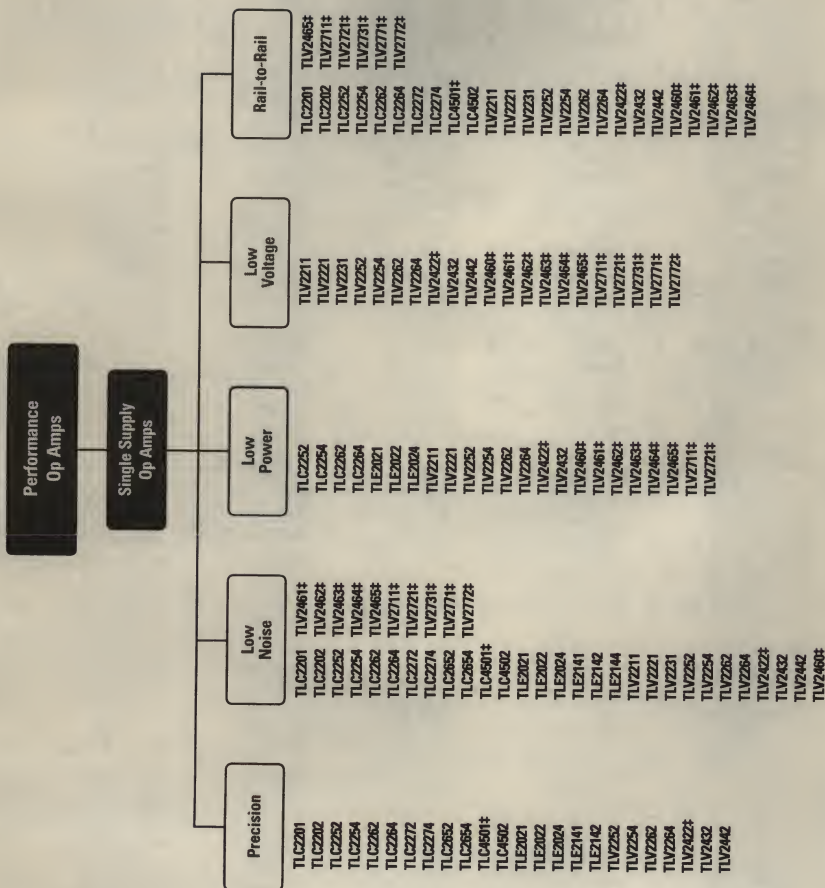
Performance Op Amps—Rail-to-Rail (Continued)

Device	V_{IO} (μ V)		V_{DD}/V_{CC} (V)		$I_{OP/CC}$ (mA/channel)		I_{BI} (pA)		CMRR (dB)		Slew Rate (V/ μ s)		GBW (MHz)		V_{IC} (nV/ \sqrt{Hz})		Description
	typ	max	min	max	typ	max	typ	max	typ	max	typ	max	typ	max	typ	max	
TLC2254*	200	850 to 1500	4.4	16	0.035	0.0625	1	83	0.12	0.2	0.12	0.2	0.2	19			Quad Rail-to-Rail μ Power
TLC2262*	300	950 to 2500	4.4	16	0.2	0.25	1	83	0.55	0.82	0.55	0.82	0.82	12			Dual Advanced LinCMOS Rail-to-Rail
TLC2264*	300	950 to 2500	4.4	16	0.2	0.25	1	83	0.55	0.82	0.55	0.82	0.82	12			Quad Advanced LinCMOS Rail-to-Rail
TLC2272*	300	950 to 2500	4.4	16	1.1	1.5	1	75	3.6	2.18	3.6	2.18	2.18	9			Dual Low-Noise Rail-to-Rail
TLC2274*	300	950 to 2500	4.4	16	1.1	1.5	1	75	3.6	2.18	3.6	2.18	2.18	9			Quad Low-Noise Rail-to-Rail
TLC2202*	80 to 100	500 to 1000	4.6	16	0.85	1.3	1	110	2.5	1.9	2.5	1.9	1.9	8			Dual Low-Noise Precision Rail-to-Rail
TLC2201*	80 to 100	200 to 500	4.6	16	1	1.5	1	110	2.5	1.8	2.5	1.8	1.8	8			Low Noise Precision Rail-to-Rail Output

* Rail-to-rail output

† Rail-to-rail input and output

‡ Devices released since 1997 Designer's Guide



† Devices released since 1997 Designer's Guide

Performance Op Amps—Single-Supply

Device	V_{DD}/V_{CC} (V)		I_{OP}/I_{CC} (mA/channel)		V_{IC} (μ V)		I_{in} (pA)	CMRR (dB)	Slew Rate (V/ μ s)	GBW (MHz)	V_n (nV/ \sqrt{Hz})	Description
	min	max	typ	max	typ	max	typ	typ	typ	typ	typ	
TLV2771†	2.5	5.5	1	2	360	1600 to 2500	2.00	96	10.5	5.1	17	Single 2.7-V High-Slew-Rate Rail-to-Rail Output
TLV2772†	2.5	5.5	1	2	360	1600 to 2500	2.00	96	10.5	5.1	17	Dual 2.7-V High-Slew-Rate Rail-to-Rail Output
TLV2721†	2.7	10	0.11	0.15	610	3000	1.00	85	0.18	0.51	19	Single LinCMOS Rail-to-Rail Very Low-Power
TLV2731†	2.7	10	0.85	1.3	710	3000	1.00	70	1.6	2	15	Single LinCMOS Rail-to-Rail Low-Power
TLV2211*	2.7	10	0.013	0.025	450	3000	1	83	0.025	0.065	22	Single LinCMOS Rail-to-Rail μ Power
TLV2711†	2.7	10	0.013	0.025	450	3000	1	83	0.025	0.065	21	Single LinCMOS Rail-to-Rail μ Power
TLV2252*	2.7	8	0.034	0.0625	200	850 to 1500	1	75	0.1	0.187	19	Dual Rail-to-Rail Low-Voltage μ Power
TLV2254*	2.7	8	0.034	0.0625	200	850 to 1500	1	75	0.1	0.187	19	Quad Rail-to-Rail Low-Voltage μ Power
TLV2422†	2.7	10	0.05	0.075	300	950 to 2000	1	90	0.02	0.052	18	Advanced LinCMOS Rail-to-Rail Output Wide-Input-Voltage Dual
TLV2432*	2.7	10	0.098	0.125	300	950 to 2000	1	83	0.25	0.5	22	Advanced LinCMOS Rail-to-Rail Output Wide-Input-Voltage Dual
TLV2221*	2.7	10	0.110	0.150	610	3000	1	85	0.18	0.51	19	Single LinCMOS Rail-to-Rail μ Power
TLV2262*	2.7	8	0.2	0.25	300	950 to 2500	1	75	0.55	0.67	12	Dual Rail-to-Rail Low-Voltage Low-Power
TLV2264*	2.7	8	0.2	0.25	300	950 to 2500	1	75	0.55	0.67	12	Quad Rail-to-Rail Low-Voltage Low-Power
TLV2460†	2.7	6	0.5	0.575	100	2000	4400	80	1.8	4.4	11	Single Low-Power, Rail-to-Rail Input/Output
TLV2461†	2.7	6	0.5	0.575	100	2000	4400	80	1.8	4.4	11	Single Low-Power, Rail-to-Rail Input/Output
TLV2462†	2.7	6	0.5	0.575	100	2000	4400	80	1.8	4.4	11	Dual Low-Power, Rail-to-Rail Input/Output

* Rail-to-rail output

† Rail-to-rail input and output

‡ Devices released since 1997 Designer's Guide

Performance Op Amps—Single-Supply (Continued)

Device	V_{DD}/V_{CC} (V)	I_{DD}/I_{CC} (mA/channel)	V_{IO} (μ V)	I_{IB} (pA)	CMRR (dB)	Slew Rate (V/ μ s)	GBW (MHz)	V_{OS} (nV/Hz)	Description
	min	max	typ	max	typ	typ	typ	typ	
TLV2463††	2.7	6	0.5	0.575	100	2000	4400	80	Dual Low-Power, Rail-to-Rail Input/Output
TLV2464††	2.7	6	0.5	0.575	100	2000	4400	80	Quad Low-Power, Rail-to-Rail Input/Output
TLV2465††	2.7	6	0.5	0.575	100	2000	4400	80	Quad Low-Power, Rail-to-Rail Input/Output
TLV2442*	2.7	10	0.75	1.1	300	950 to 2000	1	75	Advanced LincMOS Rail-to-Rail Output Wide-Input-Voltage Dual
TLV2231*	2.7	10	0.850	1.200	710	3000	1	70	Single LincMOS Rail-to-Rail μ Power
TLC2652	3.8	16	1.5	2.4	0.5 to 0.6	1 to 3	4	140	Precision Chopper-Stabilized
TLE2021	4	40	0.2	0.3	80 to 120	200 to 500	25000	115	Precision Low-Power Single Supply
TLE2022	4	40	0.275	0.35	70 to 150	150 to 500	35000	106	Dual Precision Low-Power Single Supply
TLE2024	4	40	0.2625	0.35		500 to 1000	50000	102	Quad Precision Low-Power Single Supply
TLC4501††	4	6	1	1.5	10	40 to 80	1	100	Advanced LinePIC Self- Calibrating (Self-Cal) Precision Single
TLC4502*	4	6	2.5	3.5	10	50 to 100	1	100	Advanced LinePIC Self- Calibrating Precision Dual
TLE2141	4	44	3.5	4.5	175 to 200	500 to 900	-700000	108	Low Noise High-Speed Precision Single Supply
TLE2142	4	44	3.45	4.5	275 to 290	750 to 1200	-700000	108	Dual Low-Noise High-Speed Precision
TLE2144	4	44	3.45	4.5	500 to 600	1500 to 2400	-700000	108	Quad Low-Noise High-Speed Precision
TLC2252*	4.4	16	0.035	0.0625	200	850 to 1500	1	83	Dual Rail-to-Rail μ Power
TLC2254*	4.4	16	0.035	0.0625	200	850 to 1500	1	83	Quad Rail-to-Rail μ Power

* Rail-to-rail output

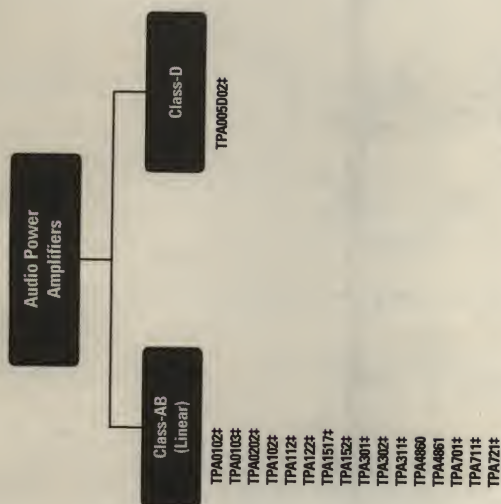
† Rail-to-rail input and output

‡ Devices released since 1997 Designer's Guide

Performance Op Amps—Single-Supply (Continued)

Device	V_{DD}/V_{CC} (V)		I_{OQ}/I_{CC} (mA/channel)		V_{IO} (μ W)		I_{IO} (pA)		CMRR (dB)		Slew Rate (V/ μ s)		GBW (MHz)		V_n (nV/ \sqrt{Hz})		Description
	min	max	typ	max	typ	max	typ	max	typ	max	typ	max	typ	max	typ	max	
TLC2262*	4.4	16	0.2	0.25	300	950 to 2500	1		83		0.55		0.82		12		Dual Advanced LinCMOS Rail-to-Rail
TLC2264*	4.4	16	0.2	0.25	300	950 to 2500	1		83		0.55		0.82		12		Quad Advanced LinCMOS Rail-to-Rail
TLC2272*	4.4	16	1.1	1.5	300	950 to 2500	1		75		3.6		2.18		9		Dual Low-Noise Rail-to-Rail
TLC2274*	4.4	16	1.1	1.5	300	950 to 2500	1		75		3.6		2.18		9		Quad Low-Noise Rail-to-Rail
TLC2654	4.6	16	1.5	2.4	4 to 5	10 to 20	50		125		3.7		1.9		13		Low-Noise Chopper-Stabilized
TLC2202*	4.6	16	0.85	1.3	80 to 100	500 to 1000	1		110		2.5		1.9		8		Dual Low-Noise Precision Rail-to-Rail
TLC2201*	4.6	16	1	1.5	80 to 100	200 to 500	1		110		2.5		1.8		8		Low Noise Precision Rail-to-Rail Output

* Rail-to-rail output
† Rail-to-rail input and output
‡ Devices released since 1997 Designer's Guide



† Devices released since 1997 Designer's Guide

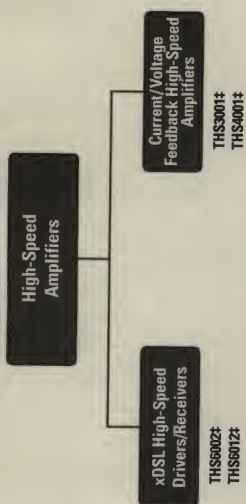
Audio Power Amplifiers

Device	Power Type	$R_{DS(on)}$ (Ω)	THD+N (%)	V_{CC}/V_{DD} (V)	I_{CC}/I_{DD} (mA)	PSRR @ 1 kHz (dB)	Shutdown Control (μA)	Packages	Description
Class-AB (Linear)									
TPA152†	0.075	0.021	0.021	4.5	5.5	81	N/A	8-pin SOIC	Stereo Audio Power Amplifier
TPA102†	0.15	0.05	0.05	2.5	5.5	76	10	8-pin MSOP*	Stereo Audio Power Amplifier
TPA112†	0.15	0.05	0.05	2.5	5.5	76	N/A	8-pin SOIC/MSOP*	Stereo Audio Power Amplifier
TPA122†	0.15	0.05	0.05	2.5	5.5	76	10	8-pin SOIC/MSOP*	Stereo Audio Power Amplifier
TPA302†	0.3	0.08	0.2	2.7	5.5	65	0.6	8-pin SOIC**	Stereo Audio Power Amplifier
TPA301†	0.35	0.3	0.3	2.5	5.5	78	0.15	8-pin SOIC/MSOP*	Mono Audio Power Amplifier
TPA311†	0.35	0.3	0.3	2.5	5.5	78	7	8-pin SOIC/MSOP*	Mono Audio Power Amplifier
TPA701†	0.7	0.2	0.2	2.5	5.5	78	0.0015	8-pin SOIC/MSOP*	Mono Audio Power Amplifier
TPA711†	0.7	0.2	0.2	2.5	5.5	78	7	8-pin SOIC/MSOP*	Mono Audio Power Amplifier
TPA721†	0.7	0.2	0.2	2.5	5.5	78	7	8-pin SOIC/MSOP*	Mono Audio Power Amplifier
TPA4860	1	0.3	0.3	2.7	5.5	75	0.6	16-pin SOIC	Mono Audio Power Amplifier
TPA4861	1	0.3	0.3	2.7	5.5	75	0.6	8-pin SOIC**	Mono Audio Power Amplifier
TPA0102†	1.5	0.05	3	5.5	19	75	5	24-pin TSSOP*	Stereo Audio Power Amplifier
TPA0103†	1.75	0.05	3	5.5	9	75	5	24-pin TSSOP*	3-Channel Stereo Audio Power Amplifier
TPA0202†	2	0.05	3	5.5	19	75	5	24-pin TSSOP*	Stereo Audio Power Amplifier
TPA1517†	6.45	10.02	9.5	18	40	65	7	20-pin SOIC/DIP**	Stereo Audio Power Amplifier
Class-D									
TPA005D02†	2	0.4	4.5	5.5	25	40	400	48-pin TSSOP*	Stereo Class-D Audio Power Amplifier

*PowerPAD package

**Thermally enhanced package

†Devices released since 1987 Designer's Guide



† Devices released since 1997 Designer's Guide

Current/Voltage Feedback High-Speed Amplifiers

Device	5 V	V_{CC}/N_{DD} ± 5 V	A_{CL} min	A_{CL} (MHz)	Slew Rate (V/ μ s)	T_s 0.1% (ns)	THD $E_c = 1$ MHz (dB)	V_n (nV/ $\sqrt{\text{Hz}}$)	Diff Gain (%)	Diff Phase ($^\circ$)	Description
THS3001†	✓	✓	✓	1	420	6500	40	-96	0.01	0.02	420-MHz Current Feedback Amplifier
THS4001†	✓	✓	✓	1	270	400	40	-72	0.01	0.08	270-MHz Voltage Feedback Amplifier

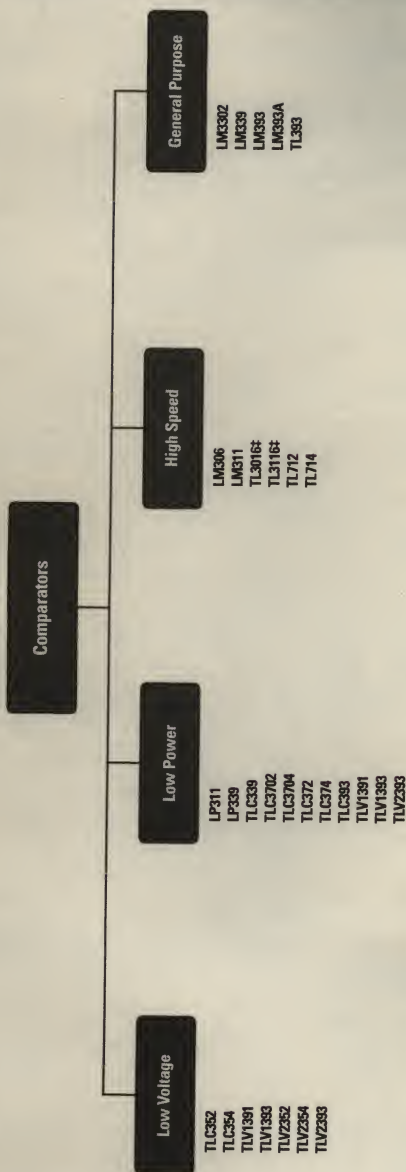
† Devices released since 1987 Designer's Guide

xDSL High-Speed Drivers/Receivers

Device	± 5 V	V_{CC}/N_{DD} ± 15 V	BW (MHz)	Slew Rate (V/ μ s)	V_n (nV/ $\sqrt{\text{Hz}}$)	THD $E_c = 1$ MHz (dB)	I_o (mA)	Description
THS6002†	✓	✓	140	1000	1.7	-62	500	Dual Differential Line Drivers and Receivers
THS6012†	✓	✓	140	1300	1.7	-65	500	500-mA Dual Differential Line Driver

† Devices released since 1987 Designer's Guide

Comparators



† Devices released since 1997 Designer's Guide

Low Voltage Comparators

Device	V_{DD}/V_{SS} (V)		I_{CC}/I_{DD} (mA/μA)	Low-High (μs)	V_{IO} (mV)	V_{ICP} (V)	I_{OA} (mA)	Description
	min	max	max	typ	max	min	max	
TLC352	1.4	16	0.15	0.2	5	0	4	Dual Low-Voltage, LinCMOS™ Differential Comparator
TLC354	1.4	16	0.15	0.2	5	0	4	Quad, Low-Voltage, LinCMOS Differential Comparator
TLV1303	2	7	0.125	0.7	5	0	1.8	Dual Low-Voltage, Low-Power Differential Comparator
TLV2362	2	8	0.125	0.2	5	0	2	Dual Low-Voltage LinCMOS Differential Comparator
TLV2354	2	8	0.125	0.2	5	0	2	Quad Low-Voltage LinCMOS Differential Comparator
TLV1391	2	7	0.150	0.65	5	0	3.8	Single Differential Comparator
TLV2393	2	7	0.65	0.45	5	0	1.8	Dual Low-Voltage Differential Comparator

Low Power Comparators

Device	I_{CC}^{typ} (mA/typ)	V_{sat}^{typ} (V)	t_{prop} Low-Power (μ s)	V_{IO} (mV)	V_{OL} (V)	I_{OL} (mA)	Description
TLC339	0.02	3	1	5	0	4	Quad, μ Power, LinCMOS Comparator
TLC3702	0.02	3	1.1	5	0	4	Dual, μ Power, Push-Pull Outputs, LinCMOS Voltage Comparator
TLC3704	0.02	3	1.1	5	0	4	Quad, μ Power, Push-Pull Outputs, LinCMOS Voltage Comparator
TLC393	0.02	3	1.1	5	0	4	Dual, μ Power, LinCMOS Voltage Comparator
LP339	0.025	4	1.3	5	0	3.5	Quad, Low-Power, General Purpose Differential Comparator
TLV1393	0.125	2	0.7	5	0	1.8	Dual Low-Voltage, Low-Power Differential Comparator
TLC372	0.15	3	0.2	5	0	4	Dual General Purpose LinCMOS Differential Comparator
TLC374	0.15	3	0.2	5	0	4	Quad General Purpose LinCMOS Differential Comparator
TLV1391	0.150	2	0.65	5	0	3.8	Single Differential Comparator
LP311	0.3	4	1.2	7.5	-14.5	13.5	Single, Low-Power, Strobed Differential Comparator
TLV2393	0.65	2	0.45	5	0	1.8	Dual Low-Voltage Differential Comparator

High Speed Comparators

Device	t_{trsp} Low-High (μs) typ	$I_{\text{os}}/I_{\text{cc}}$ (mA/ch) max	$V_{\text{os}}/V_{\text{cc}}$ (V) min max	V_{io} (mV) max	V_{icr} (V) min max	I_{ol} (mA) min	Description
TL714	0.006	12	4.75	5.25	0	5	High-Speed Differential Comparator
TL3016†	0.0078	12.5	-7	7	-3.75	3.5	Ultra-Fast Low-Power Precision Comparator
TL3116†	0.0099	14.7	-7	7	-5	2.5	Ultra-Fast Low-Power Precision Comparator
TL712	0.025	20	4.75	5.25	0	5	Differential Comparator
LM306	0.028	6.8	-6	12	-5	5	Single, Strobed, High-Speed Differential Comparator
LM311	0.115	7.5	4	30	-14.7	13.8	Single, Strobed Differential Comparator

† Devices released since 1987 Designer's Guide

General Purpose Comparators

Device	V_{ih} (mV) max	$V_{\text{os}}/V_{\text{cc}}$ (V) min max	$I_{\text{os}}/I_{\text{cc}}$ (mA/ch) max	t_{trsp} Low-High (μs) typ	V_{icr} (V) min max	I_{ol} (mA) min	Description
LM3302	20	2	28	0.3	0	3.5	Quad, General Purpose Differential Comparator
LM339	5	4	30	0.3	0	3.5	Quad, General Purpose Differential Comparator
LM393	5	4	30	0.3	0	3.5	Dual, General Purpose Differential Comparator
LM393A	2	4	30	0.3	0	3.5	Dual, General Purpose Differential Comparator
TL393	5	2	7	0.2	0	3.8	Dual, General Purpose Differential Comparator

Data Converters

Contents

Introduction & New Product Previews	2-2
Product Decision Trees and Selection Guides	
Data Converters Overview	2-3
Analog-to-Digital Converters	2-4
Digital-to-Analog Converters	2-7
Analog Front Ends	2-9
Special Functions	2-11
Voice Band Audio Processors (VBAPs)	2-12
Stereo Audio Converters	2-13
Line-Card Codec (Combo)	2-14

For technical assistance, requesting datasheets or samples, see Contact Information in Appendix A.

Two other resources for product information are:

- 1) the InfoNavigator CD-ROM (literature # SLYC005B)**
- 2) the Semiconductor products category at the TI web site www.ti.com**

The Texas Instruments family of data converters provide cost effective, versatile solutions for data acquisition systems. This section provides a specification summary for the analog-to-digital converters (ADCs), the digital-to-analog converters (DACs), and special functions such as ADC for flex pager chipset. Fabricated from the TI advanced bipolar, CMOS and BiCMOS fabrication processes, the devices have excellent performance characteristics and quality.

The general purpose ADCs are used for applications such as

- Instrumentation
- Automotive
- Military
- Process Monitoring and Control
- Medical
- Battery Operated Equipment

The general purpose DACs can be used for applications such as

- Programmable Voltage Sources
- Mobile Communications
- Military
- Test Equipment
- Digitally Controlled Amplifiers
- Process Control
- Mass Storage

The high-speed video ADCs and DACs are used for applications such as

- Quadrature Phase Shift Keying (QPSK)
- Digital Down Converters
- Communications
- Digital Set Top Boxes
- Video Signal Processing
- Flat Panel Displays

Data Converters New Product Previews

The following new devices are expected to be released in the near future. For more information, please refer to the InfoNavigator CD-ROM, literature number SLYC005B.

Device Description

Analog-to-Digital

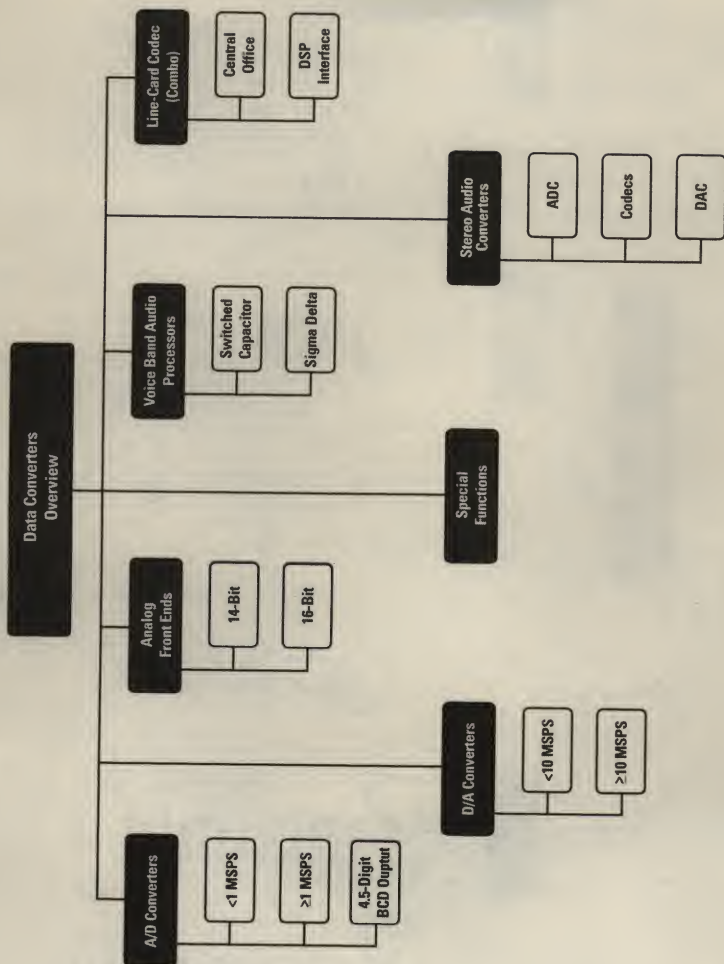
TLV5540	Analog-to-Digital 8-Bit, 30-MSPS ADC, 3-V version of TLC5540
TLV5580	Analog-to-Digital 8-Bit, 80-MSPS ADC, 3-V
TLV2548	Analog-to-Digital 12-Bit, 200-kSPS ADC, 8 inputs
TLV2544	Analog-to-Digital 12-Bit, 200-kSPS ADC, 4 inputs
TLV1578	Analog-to-Digital 8 inputs, 10-Bit, 1.2 MSPS
TLV1571	Analog-to-Digital 1 input, 10-Bit, 1.2 MSPS

Digital-to-Analog

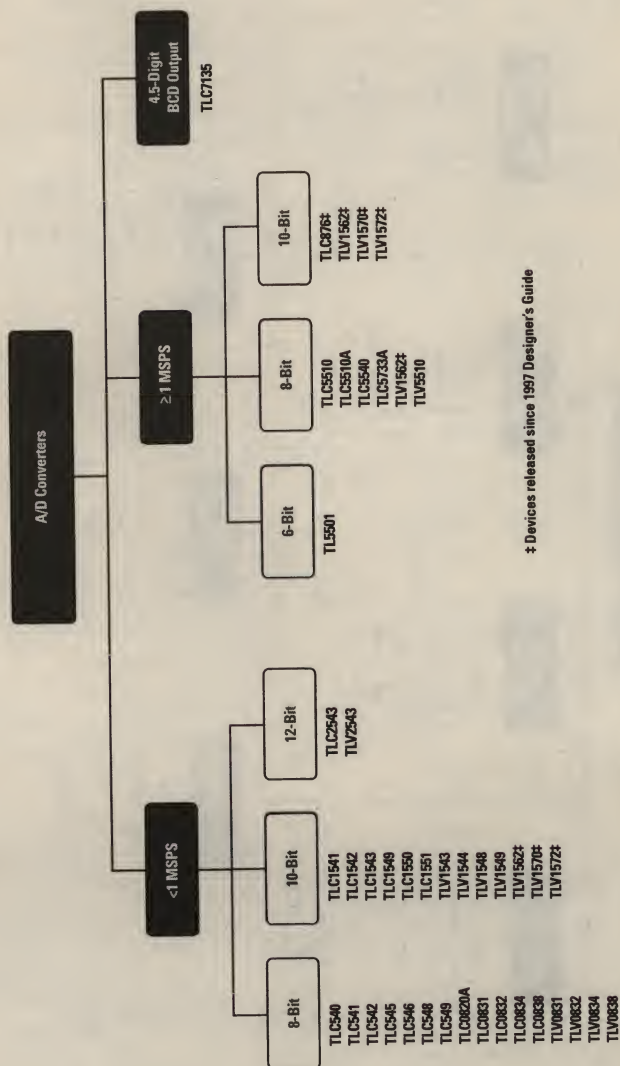
THS5641	Digital-to-Analog 8-Bit, 125-MSPS Comms DAC
THS5651	Digital-to-Analog 10-Bit, 125-MSPS Comms DAC
TLV5633	Digital-to-Analog 12-Bit, 1- μ S DAC
TLV5639	Digital-to-Analog 12-Bit, 1- μ S DAC
TLV5637	Digital-to-Analog Dual 10-Bit, 1- μ S DAC
TLV5638	Digital-to-Analog Dual 12-Bit, 1- μ S DAC
TLV5636	Digital-to-Analog 12-Bit, 1- μ S DAC

Web Locations for Specific Product Groups

ADCs and DACs	www.ti.com/sc/docs/msp/dacq/default.htm
Analog Front Ends	www.ti.com/sc/docs/msp/dacq/default.htm
Stereo Audio Converters	www.ti.com/sc/docs/msp/audio/index.htm



Analog-to-Digital Converters



‡ Devices released since 1997 Designer's Guide

<1 MSPS Analog-to-Digital Converters

Device	Resolution (Bits)	Conv. Rate (kSPS)	Conv. Time (μ s)	Supply (V)	Digital Interface Type	Number of Analog Inputs	Power Diss. (mW) typ	SPI Compatible	DNL (LSB)	INL (LSB)	Description
8-Bit											
TLV0838	8	37.9	13	3.3	Serial	8	0.66	Y	0.5	1	3-V Version of TLC0838
TLV0834	8	41	13	3.3	Serial	4	0.66	Y	0.5	1	3-V Version of TLC0834
TLV0832	8	44.7	13	3.3	Serial	2	5	Y	0.5	1	3-V Version of TLC0832
TLV0831	8	49	13	3.3	Serial	1	0.66	Y	0.5	1	3-V Version of TLC0831
TLC0834	8	20	13.3	5	Serial	4	3	Y	1	1	Improved ADC0834
TLC0838	8	20	13.3	5	Serial	8	3	Y	1	1	Improved ADC0838
TLC0832	8	22	13.3	5	Serial	2	7.5	Y	1	1	Improved ADC0832
TLC542	8	25	20	5	Serial	11	6	Y	0.5	1	Replaces MC145041
TLC0831	8	31	13.3	5	Serial	1	3	Y	1	1	Improved ADC0831
TLC541	8	40	17	5	Serial	11	6	Y	0.5	1	Compatible with TLC1540 Pinout Timing Compatible with TLC540
TLC546	8	40	17	5	Serial	19	6	Y	0.5	1	Single Input Version of TLC540
TLC549	8	40	17	5	Serial	1	8	Y	0.5	1	Single Input Version of TLC540
TLC548	8	45.5	17	5	Serial	1	8	Y	0.5	1	Single Input Version of TLC540
TLC540	8	75	9	5	Serial	11	6	Y	0.5	1	Replaces ADC0811 & MC145040
TLC545	8	76	9	5	Serial	19	6	Y	0.5	1	Timing Compatible with TLC540
TLC0820A	8	392	2.5	5	Parallel	1	37.5	N	1	1	Replaces AD7820 & ADC0820
10-Bit											
TLV1544	10	85	10	2.7 to 5.5	Serial	4	3	Y	1	1	2.7-V DSP Interface
TLV1548	10	85	10	2.7 to 5.5	Serial	8	3	Y	1	1	2.7-V DSP Interface
TLV1572†	10	625	1	2.7 to 5.5/ 2.7 to 5.5*	Serial	1	8	Y	1	1	Fastest 10-Bit Serial ADC
TLV1570†	10	625	0.5	2.7 to 5.5/ 2.7 to 5.5*	Serial	8	8	Y	1	1	Glueless TMS320 Interface
TLV1562†	10, 8, 4	2000, 3000, 7000	4	2.7 to 5.5/ 2.7 to 5.5*	Parallel	4	6	Y	1.5	1.5	Programmable Resolution vs. Speed
TLV1543	10	38	21	3.3	Serial	11	4	Y	1	1	3-V Version of TLC1543
TLV1549	10	38	21	3.3	Serial	1	1.3	Y	1	1	3-V Version of TLC1549
TLC1541	10	32	21	5	Serial	11	6	Y	1	1	Pinout Compatible 8-, 10-, & 12-Bit Versions
TLC1542	10	38	21	5	Serial	11	4	Y	0.5	1	Pinout Compatible 8-, 10-, & 12-Bit Versions
TLC1543	10	38	21	5	Serial	11	4	Y	1	1	Plug-In Upgrade for TLC542
TLC1549	10	38	21	5	Serial	1	4	Y	1	1	Plug-In Upgrade for TLC549
TLC1550	10	164	6	5	Parallel	1	10	N	0.5	1	DSP Front-End with Tri-State Output
TLC1551	10	164	6	5	Parallel	1	10	N	1	1	DSP Front-End with Tri-State Output

*Soft supply; Analog Supply/Digital Supply.

†Devices released since 1987 Designer's Guide

<1 MSPS Analog-to-Digital Converters (Continued)

Device	Resolution (Bits)	Conv. Rate (kSPS)	Conv. Time (μ s)	Supply (V)	Digital Interface Type	Number of Analog Inputs	Power Diss. (mW) typ	SPI Compatible	DNL (LSB)	INL (LSB)	Description
12-Bit											
TLV2543	12	66	10	3.3	Serial	11	3.3	Y	1	1	3-V Version of TLC2543
TLC2543	12	66	10	5	Serial	11	5	Y	1	1	Low Cost, High Resolution

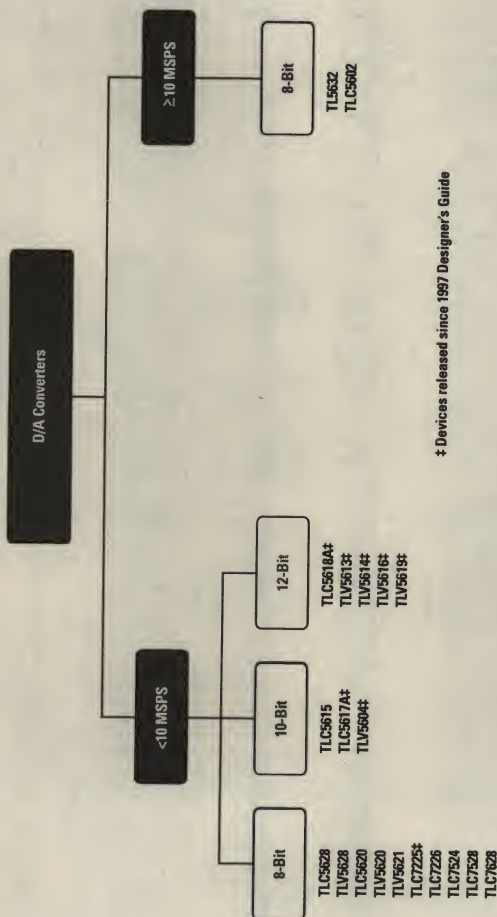
≥1 MSPS Analog-to-Digital Converters

Device	Resolution (Bits)	Conv. Rate (MSPS)	Supply (V)	Digital Interface Type	Number of Analog Inputs	Power Diss. (mW) typ	SNR (dB)	SFDR (dB)	DNL (LSB)	INL (LSB)	Description
6-Bit											
TL5501	6	20	5/5*	Parallel	1	200			0.80%		Low Power, Ultra-High-Speed Video
8-Bit											
TLV1562†	10,8,4	2,3,7	2.7 to 5.5/ 2.7 to 5.5*	Parallel	4	6	58.1	-70.3	1.5	1.5	Programmable Resolution vs. Speed
TLV5510	8	10	2.7 to 3.6	Parallel	1	42	38	41	0.75	1	Video and Communications
TLC5510	8	20	5/5*	Parallel	1	90	46	45	0.5	1	Replaces Sony CXD1175
TLC5510A	8	20	5/5*	Parallel	1	90	46	45	0.5	1	0- to 4-V Full-Scale Input
TLC5540	8	40	5/5*	Parallel	1	85	45		0.75	1	Replaces TMC1175
TLC5739A	8	20	5/2.7 to 5.25*	Parallel	3	250			0.75	1	Triple ADC with Clamp
10-Bit											
TLV1572†	10	1,25	2.7 to 5.5/ 2.7 to 5.5*	Serial	1	8		62	1	1	Fastest 10-Bit, Serial ADC
TLV1570†	10	1,25	2.7 to 5.5/ 2.7 to 5.5*	Serial	8	8	61	-59	1	1	Glueless TMS320 Interface
TLV1562†	10,8,4	2,3,7	2.7 to 5.5/ 2.7 to 5.5*	Parallel	4	6	58.1	-70.3	1.5	1.5	Programmable Resolution vs. Speed
TLC876†	10	20	5/3.3 to 5*	Parallel	1	107	55	-64	0.5	1.5	Improved AD876

* Split supply; Analog Supply/Digital Supply
† Devices released since 1987 Designer's Guide

4.5-Digit, Multiplexed BCD-Output, Dual-Slope Analog-to-Digital Converter

Device	Resolution (Digits)	Supply (V)	Power (mW) max	Conversion Time (ms)	Sampling (SPS) max	Analog Inputs	Linearity Error (LSB)
TLC7135	4.5	±5	30	33.3	30	1	0.5



<10 MSPS Digital-to-Analog Converters

Device	Resolution (Bits)	Settling Time (μ s)	Supply (V)	Digital Interface Type	Number of DACs	Power (mW) typ	Output (I or V)	SNR-D (dB)	DNL (LSB)	INL (LSB)	Description
8-Bit											
TLV5628	8	10	2.7 to 5.5	Serial	8	13	V		1	1	3-V Version of TLC5628
TLV5620	8	10	2.7 to 5.5	Serial	4	6	V		1	1	3-V Version of TLC5620
TLV5621	8	10	2.7 to 5.5	Serial	4	3.3	V		1	1	x2 Output with Powerdown
TLC5628	8	10	5	Serial	8	75	V		1	1	x2 Output
TLC5620	8	10	5	Serial	4	75	V		1	1	x2 Output
TLC7524	8	0.1	5.0 to 15	Parallel	1	5	I		0.5	1	Latch for DSP and μ P's
TLC7528	8	0.1	5.0 to 15	Parallel	2	10	I		0.5		Dual Version of TLC7524
TLC7225†	8	5	5.0 to 15	Parallel	4	75	V		1	1	Separate Reference for each DAC
TLC7628	8	0.1	11.0 to 15	Parallel	2	20	I		0.5		Dual MDAC with TTL-Compatible Inputs
TLC7226	8	5	15	Parallel	4	96	V		1	1	Replaces AD7226
10-Bit											
TLV5604‡	10	3 to 9	2.7 to 5.5/ 2.7 to 5.5*	Serial	4	9	V	65	1	1	TMS320 Compatible
TLC5617A†	10	2.5 to 12.5	5	Serial	2	8.8	V	81	0.5	1	Programmable Settling Time
TLC5615	10	12.5	5	Serial	1	1.3	V	60	0.5	1	Improved Max515
12-Bit											
TLC5618A†	12	2.5 to 12.5	5	Serial	2	8.8	V	78	1	4	Programmable Settling Time
TLV5619†	12	1	2.7 to 5.5	Parallel	1	4.5	V	69	1	4	TMS320 Compatible
TLV5613†	12	1 to 3.5	2.7 to 5.5/ 2.7 to 5.5*	Parallel	1	4.2	V	69	1	4	Microcontroller Compatible (8-Bit Data Bus)
TLV5614†	12	3 to 9	2.7 to 5.5/ 2.7 to 5.5*	Serial	4	9.6	V	58	1	3	Programmable Settling Time
TLV5616†	12	3 to 9	2.7 to 5.5	Serial	1	2.1	V	65	1	4	Variable Speed

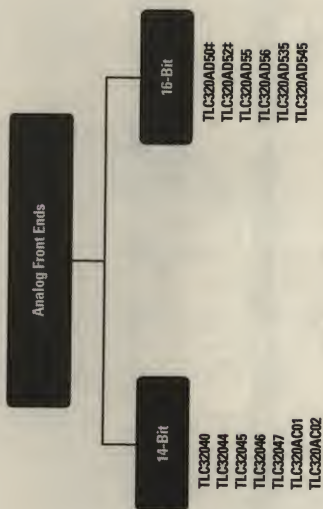
* Split supply: Analog Supply/Digital Supply

† Devices released since 1997 Designer's Guide

≥10 MSPS Digital-to-Analog Converters

Device	Resolution (Bits)	Update Rate (kHz)	Settling Time (ns)	Digital Supply (V)	Number of Interface DACs	Power (mW) typ	SFDR (dB)	SNR (dB)	DNL (LSB)	Description
8-Bit										
TLC5602	8	20	30	5/5*	Parallel	1	80		0.20%	8-Bit, Video Apps.
TL5632	8	60	10	5/5*	Parallel	3	350		0.5	High Speed, Video Apps.

* Split supply: Analog Supply/Digital Supply



* Devices released since 1997 Designer's Guide

Analog Front Ends

Device	Band Pass Filter (1-dB) (kHz)	Low Pass Filter (2-dB) (kHz)	Sampling Rate (kHz) (max)	Sin x/z Correction	Internal V Ref	Supply Voltage (V)	Power Dissipation (mW)	Description
14-Bit								
TLC32044	150 to 3600 Hz	3600 Hz	19.2	Yes	Yes	±5	275	Bypassable ADC High Pass Filter & Programmable Gain
TLC32045	150 to 3600 Hz	3600 Hz	19.2	Yes	Yes	±5	275	Bypassable ADC High Pass Filter & Programmable Gain
TLC32040	300 to 3400 Hz	3400 Hz	19.2	No	Yes	±5	275	Bypassable ADC Band Pass Filter & Programmable Gain
TLC32046	300 to 7200 Hz	7200 Hz	25	Yes	Yes	±5	275	Bypassable ADC High Pass Filter & Programmable Gain
TLC320AC01	Up to 10.8	10.8	25	Yes	Yes	±5	100	Bandwidth Independent of Sampling Rate
TLC320AC02	Up to 10.8	10.8	25	Yes	Yes	±5	100	Same as AC01 except FSD Delay
TLC32047	450 to 10.95	10.95	25	Yes	Yes	±5	275	Bypassable ADC High Pass Filter & Programmable Gain
16-Bit								
TLC320AD55	Up to 4.41	4.41	11.025	No	Yes	+5	150	Programmable SCLK
TLC320AD535	Up to 4.96	4.96	11.025	No	Yes	+5	240	Dual Channel Voice/Data Codec
TLC320AD545	Up to 4.96	4.96	11.025	No	Yes	+5/4.3	120	Data/Fax Codec with Analog Sweep
TLC320AD56	Up to 8.82	8.82	22.05	No	Yes	+5/4.3	100	85-187-dB Dynamic Range for DAC/ADC
TLC320AD504	Up to 9.92	9.92	22.05	No	Yes	+5/4.3	120	Typical 89-dB SNR—Supports 3 Slaves
TLC320AD524	Up to 9.92	9.92	22.05	No	Yes	+5/4.3	120	Like TLC320AD50 but Supports 1 Slave

‡ Devices released since 1997 Designer's Guide

Special Functions

Special
Functions

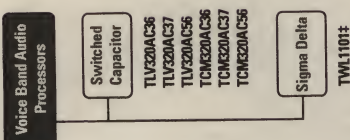
TLV5590

Device	Special Function	Full Scale Error	Zero Scale Error	Differential Nonlinearity
TLV5590	ADC for Flex Pager Chipset	1 LSB	3 LSB	<1 LSB

Voice Band Audio Processors

Decision Tree & Selection Guide

Voice Band Audio Processors

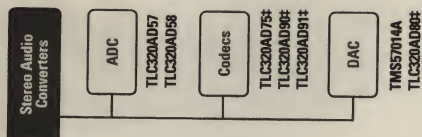


† Device released since 1997 Designer's Guide

Device	Architecture	Operating Linear Resolution	Voltage (±10%)	Program-Memory	Number of Channels	Companding	Noise Cancellation	DTMF/Tone Generation	Description
Switched Capacitor									
TLV320AC36	Switched Cap Filter	13-Bit	3	N	1	μ-Law	Y	N	Voice Band Audio Codec
TLV320AC37	Switched Cap Filter	13-Bit	3	N	1	A-Law	Y	N	Voice Band Audio Codec
TLV320AC56	Switched Cap Filter	13-Bit	3	N	1	μ-Law	N	N	Voice Band Audio Codec
TCM320AC36	Switched Cap Filter	13-Bit	5	N	1	μ-Law	Y	N	Voice Band Audio Codec
TCM320AC37	Switched Cap Filter	13-Bit	5	N	1	A-Law	Y	N	Voice Band Audio Codec
TCM320AC56	Switched Cap Filter	13-Bit	5	N	1	μ-Law	N	N	Voice Band Audio Codec
Sigma Delta									
TWL1101†	Sigma Delta	13-Bit	3	Y - I ² C Interface	1*	μ-Law	N	N	Voice Band Audio Codec

* Part has 2 MIC i/o's and 2 ear out's, selectable

† Device released since 1997 Designer's Guide

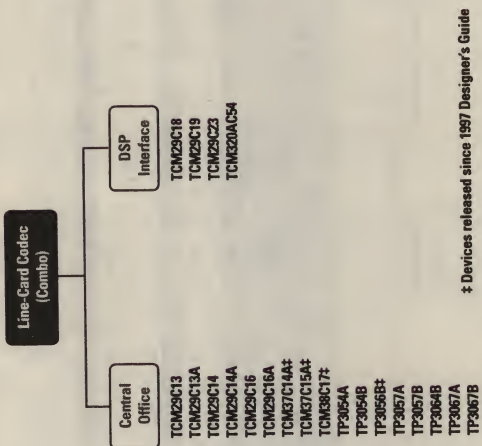


† Devices released since 1987 Designer's Guide

Device	Architecture	Power		Sampling Rate (kHz)	SNR (dB)	PSSR (dB)	Supply Voltage (V)	Description
		Resolution (Bits)	Dissipation (mW) typ					
ADC								
TLC320AD57	Sigma Delta	18	200	48	97		5	High Performance Stereo ADC
TLC320AD58	Sigma Delta	18	250	48	100		5	High Performance Stereo ADC
Codescs								
TLC320AD90†	Sigma Delta	16	280	48	90	55	3/5	AC97 Multimedia CODEC
TLC320AD91†	Sigma Delta	18	190	48	94	46	3/5	AC97 Multimedia CODEC
TLC320AD75†	Sigma Delta	20	350	48	104		5	High Performance Stereo ADA
DAC								
TLC320AD80†	Sigma Delta	16	260	48	85		5	Audio System
TMS57014A	Sigma Delta	18	350	48	100		5	Dual Stereo Over Sample DAC

† Devices released since 1987 Designer's Guide

Line-Card Codec (Combo)



* Devices released since 1997 Designer's Guide

Line-Card Codec (Combo)

Part Number	Clock Frequency (MHz)	Companding	Timing	Supply Voltage (V) typ	Number of Channels	Function
Central Office						
TP3054A	1.536, 1.544, 2.048	μ -Law	National	± 5	1	Combination Codec/Filter
TP3054B	1.536, 1.544, 2.048	μ -Law	National	± 5	1	Combination Codec/Filter
TP3064B	1.536, 1.544, 2.048	μ -Law	National	± 5	1	Combination Codec/Filter
TP3057A	1.536, 1.544, 2.048	A-Law	National	± 5	1	Combination Codec/Filter
TP3057B	1.536, 1.544, 2.048	A-Law	National	± 5	1	Combination Codec/Filter
TP3067A	1.536, 1.544, 2.048	A-Law	National	± 5	1	Combination Codec/Filter
TP3067B	1.536, 1.544, 2.048	A-Law	National	± 5	1	Combination Codec/Filter
TCM29C13	1.536, 1.544, 2.048	Both	Intel	± 5	1	Combination Codec/Filter
TCM29C13A	1.536, 1.544, 2.048	Both	Intel	± 5	1	Combination Codec/Filter
TCM29C14	1.536, 1.544, 2.048	Both	Intel	± 5	1	Combination Codec/Filter
TCM29C14A	1.536, 1.544, 2.048	Both	Intel	± 5	1	Combination Codec/Filter
TCM37C14A†	1.536, 1.544, 2.048	Both	Intel	± 5	1	PCM Combo with Programmable Gain Control
TP3058B†	1.536, 1.544, 2.048	Both	National	± 5	1	Combined PCM Codec and Filter
TCM29C16	2.048	μ -Law	Intel	± 5	1	Combination Codec/Filter
TCM29C16A	2.048	μ -Law	Intel	± 5	1	Combination Codec/Filter
TCM37C15A†	2.048	A-Law	Intel	± 5	1	PCM Combo with Programmable Gain Control
TCM38C17†	2.048	Both	Intel	± 5	4	Four-Channel (Quad) PCM Combo
DSP Interface						
TCM29C19	1.536	μ -Law	Intel	± 5	1	Combination Codec/Filter, Analog Interface to DSP
TCM320AC54	1.536, 1.544, 2.048	μ -Law	National	± 5	1	Monolithic Serial Interface Combined PCM Codec and Filter
TCM29C18	2.048	μ -Law	Intel	± 5	1	Combination Codec/Filter, Analog Interface to DSP
TCM29C23	Up to 4.096	Both	Intel	± 5	1	Combination Codec/Filter, Analog Interface to DSP

† Devices released since 1997 Designer's Guide

Data Transmission Products

Contents

New Product Previews	3-2
Product Decision Trees and Selection Guides	
Data Transmission Products Overview	3-3
Transmitters/Receivers	
LVDS	3-4
TIA/EIA-485 Standard	3-6
TIA/EIA-232-F Standard	3-8
TIA/EIA-422-B Standard	3-10
TIA/EIA-423-B Standard	3-13
IEEE Std. 488 (GPIB)	3-14
IEEE Std. 802.3 (Ethernet™)	3-15
IEEE Std. 896.1 (Futurebus)	3-16
IBM 360/370 Standard	3-17
General Purpose	3-18
Advanced Bus Solutions	3-20
SCSI Transceivers, GeoPort™/AppleTalk™ and IEEE 1394	3-21
PCI and USB	3-22
UARTs	3-23
General Purpose	3-23
IrDA, PCMCIA and Plug-n-Play (PnP)	3-24

For technical assistance, requesting datasheets or samples, see Contact Information in Appendix A.

Two other resources for product information are:

- 1) the InfoNavigator CD-ROM (literature # SLYC005B)**
- 2) the Semiconductor products category at the TI web site www.ti.com**

Data Transmission New Product Previews

The following new devices are expected to be released in the near future. For more information, please refer to the InfoNavigator CD-ROM, literature number SLYC005B.

Device Description

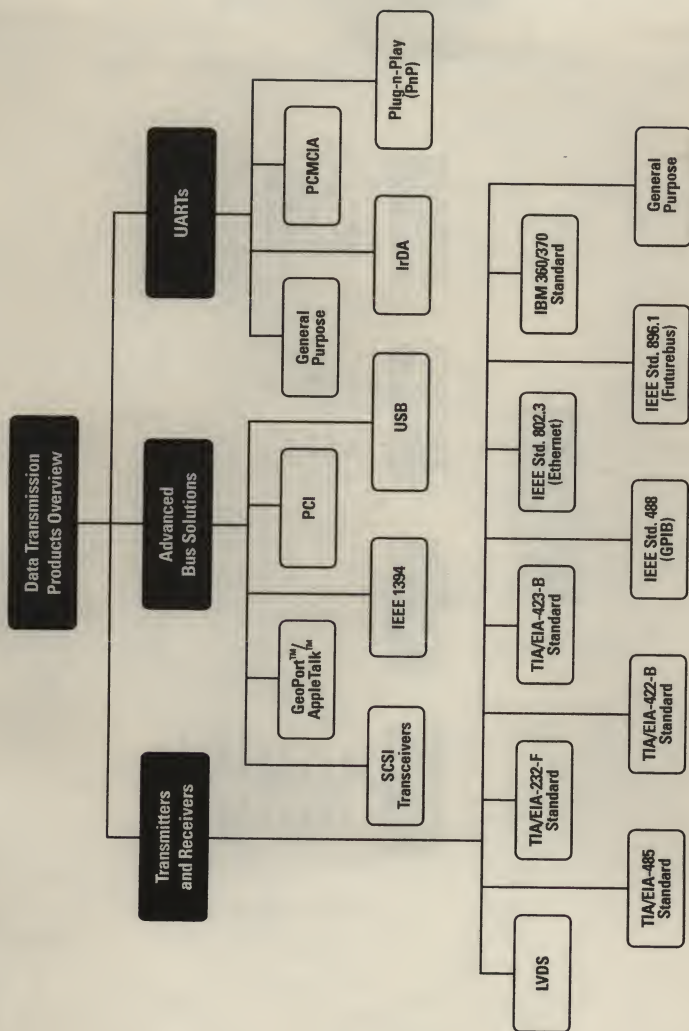
LP196	Low-Power Multiple RS-232 Drivers and Receivers
SN65ALS1176	Differential Bus Transceiver
SN65LVDM050	Dual LVDM Transceiver
SN65LVDM051	Dual LVDM Transceiver
SN65LVDM176	Single LVDM Half-Duplex Transceiver
SN65LVDM179	Single LVDM Transceiver
SN65LVDM180	Single LVDM Transceiver
SN65LVDM22	Dual Multiplexed LVDM Repeater
SN65LVDS22	Dual Multiplexed LVDS Repeater

Bus Solutions

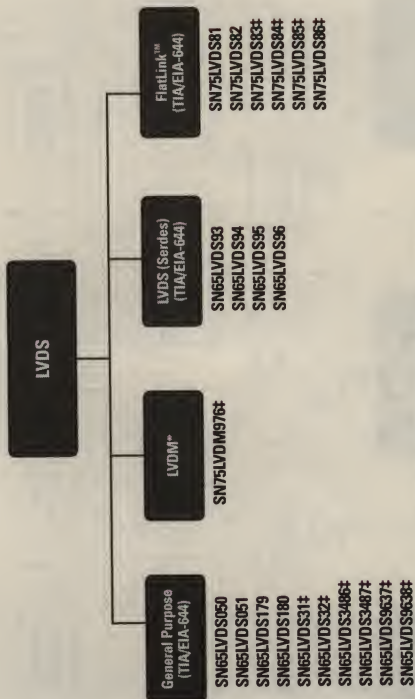
TSB12LV32	General Purpose
TSB12LV41A	MPEG2Lynx Rev A IEEE 1394
TSB41LV04	400 Meg, 3.3-V, 4-port PHY IEEE 1394
TSB41LV06	400 Meg, 3.3-V, 6-port PHY IEEE 1394

Web Locations for Specific Product Groups

Transmitters And Receivers	www.ti.com/sc/docs/msp/datatran/default.htm
UARTs	www.ti.com/sc/docs/msp/datatran/default.htm
Infrared (IrDA)	www.ti.com/sc/docs/msp/irda/default.htm
Advanced Bus Solutions	www.ti.com/sc/docs/msp/bus.htm
1394 High Performance Serial Bus	www.ti.com/sc/docs/msp/1394/1394.htm
PCI CardBus Solutions	www.ti.com/sc/docs/msp/pci/pci.htm
Universal Serial Bus (USB)	www.ti.com/sc/docs/msp/usb/mainpage.htm



Transmitters & Receivers—LVDS



* Low voltage differential multipoint transmission

† Devices released since 1997 Designer's Guide

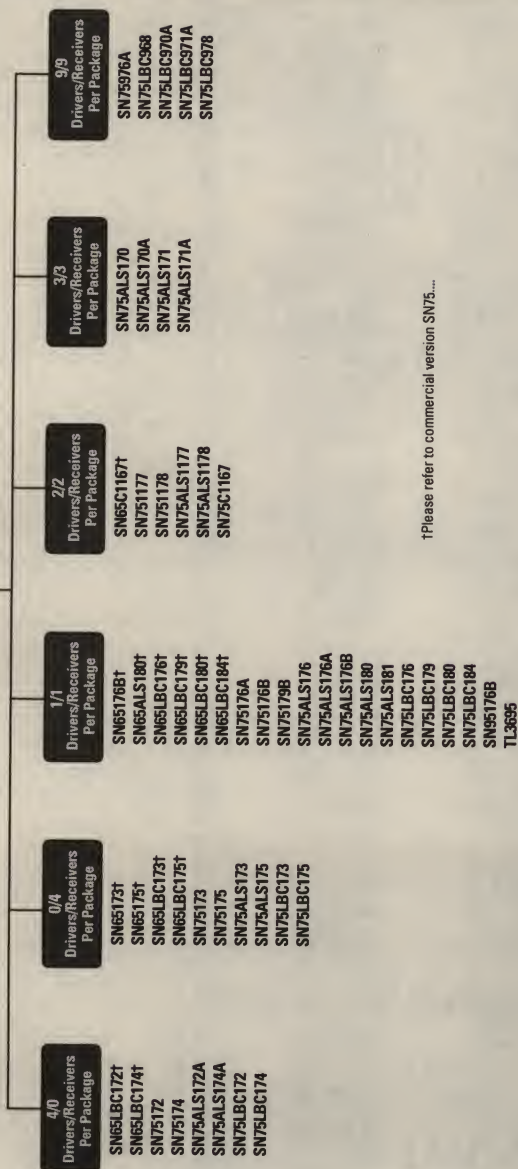
Transmitters & Receivers—LVDS

Device	Drivers/ Receivers Per Package	Drivers/ Receivers I_{pd} (ns) typ	I_{cc} (mA) typ	Supply Voltage(s) (V) typ	Package#	Description
SN65LVDS963†	0/2	NA/2.2	5.5	3.3	UA9637	Dual High-Speed Differential Receiver
SN65LVDS96†	0/3	NA/8.7	60	3.3	SN75LVDS86	High-Speed LVDS Receiver
SN65LVDS32†	0/4	NA/2.2	10	3.3	AM26LS32	Quad High-Speed Differential Receivers
SN65LVDS3486†	0/4	NA/2.2	10	3.3	MC3486	Quad High-Speed Differential Receivers
SN65LVDS94†	0/4	NA/8.7	62	3.3	SN75LVDS82	High-Speed LVDS Receiver
SN75LVDS82	0/5	NA/8.7	74	3.3	DS90C582	FlatLink Receiver
SN75LVDS85†	0/5	NA/8.7	69	3.3	DS90C561	FlatLink Transmitter
SN65LVDS179†	1/1	1.7/3	9	3.3	SN75179	Single High-Speed Differential Driver/Receiver
SN65LVDS180†	1/1	1.7/3	9	3.3	SN75ALS180	Single High-Speed Differential Driver/Receiver
SN65LVDS9638†	2/0	1.4/NA	4.7	3.3	UA9638	Dual High-Speed Differential Driver
SN65LVDS050†	2/2	1.7/3	12	3.3	MC34050	Dual High-Speed Differential Drivers/Receivers
SN65LVDS051†	2/2	1.7/3	12	3.3	MC34051	Dual High-Speed Differential Drivers/Receivers
SN65LVDS96†	3/0	14.2/NA	85	3.3	SN75LVDS85	High-Speed LVDS Transmitter
SN65LVDS31†	4/0	1.4/NA	9	3.3	AM26LS31	Quad High-Speed Differential Drivers
SN65LVDS3487†	4/0	1.4/NA	9	3.3	MC3487	Quad High-Speed Differential Drivers
SN65LVDS93†	4/0	14.2/NA	95	3.3	SN75LVDS83	High-Speed LVDS Transmitter
SN75LVDS81	5/0	14.2/NA	72	3.3	DS90C581	FlatLink Transmitter
SN75LVDS83†	5/0	14.2/NA	72	3.3	DS90C581	FlatLink Transmitter
SN75LVDS84†	5/0	14.2/NA	68	3.3	DS90C561	FlatLink Transmitter
SN75LVDS86†	5/0	14.2/NA	68	3.3	DS90C562	FlatLink Receiver
SN75LVDM976†	9/9	5.5/8.4	26	5	SN75LBC976	9-Channel Dual-Mode SCSI Transceiver

† Devices released since 1997 Designer's Guide

Transmitters & Receivers—TIA/EIA-485 Standard

TIA/EIA-485
Standard



†Please refer to commercial version SN75...

Device	Drivers/ Receivers Per Package	Drivers/ Receivers t_{pd} (ns) typ	I_{CC} (mA) typ	Supply Voltage(s) (V) typ	Footprint	Description
SN75ALS173	0/4	NA/27	16	5	AM26LS32	Quadruple Differential Line Receiver
SN75ALS175	0/4	NA/27	16	5	MC3486	Quadruple Differential Line Receiver
SN75LBC173	0/4	NA/30	11	5	AM26LS32	Quadruple Low-Power Differential Line Receiver
SN75LBC175	0/4	NA/30	11	5	MC3486	Quadruple Low-Power Differential Line Receiver
SN75173	0/4	NA/35		5	AM26LS32	Quadruple Differential Line Receiver
SN75175	0/4	NA/35		5	MC3486	Quadruple Differential Line Receiver

Device	Drivers/ Receivers Per Package	Drive Receiv- t _{pd} (n) typ
SN75ALS176A	1/1	7/18
SN75ALS176B	1/1	8/16
SN75ALS176	1/1	8/19
SN75ALS180	1/1	13/19
SN75LBC179	1/1	18/30
SN75LBC180	1/1	18/33
SN75ALS181	1/1	20/25
SN75176B	1/1	22/35
SN75179B	1/1	22/35
SN95176B	1/1	22/35
TL3695	1/1	22/37
SN75LBC176	1/1	25/33
SN75176A	1/1	60/35
SN75LBC184	1/1	1500/300
SN751177	2/2	NA/35
SN751178	2/2	NA/35
SN75C1167	2/2	12/27
SN75ALS1177	2/2	22/37
SN75ALS1178	2/2	22/37
SN75ALS170A	3/3	10.5/16.5
SN75ALS171A	3/3	11/16
SN75ALS170	3/3	13/19
SN75ALS171	3/3	13/19
SN75LBC172	4/0	20/NA
SN75LBC174	4/0	20/NA
SN75ALS172A	4/0	22/NA
SN75ALS174A	4/0	22/NA
SN75172	4/0	65/NA
SN75174	4/0	65/NA
SN75LBC970A	9/9	8.5/8.5
SN75LBC971A	9/9	8.5/8.5
SN75976A	9/9	13.5/16.5
SN75LBC978	9/9	26.4/30.7
SN75LBC968	9/9	45/25

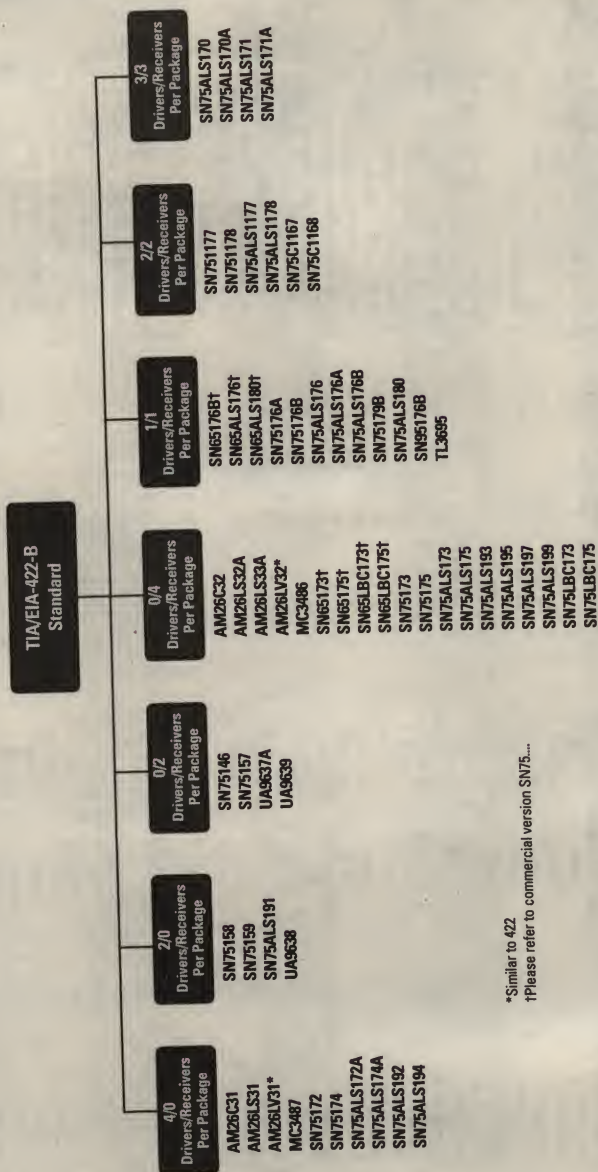
5/3
Drivers/Receivers
Per Package
G075323
SN75196

Loc (mA) typ	Supply Voltage(s) (V) typ	Footprint	Description
23	5	SN75176	Differential Bus Transceiver
23	5	SN75176	Differential Bus Transceiver
23	5	SN75176	Differential Bus Transceiver
25	5	SN75ALS180	Differential Driver/Receiver Pair
4.2	5	SN75179	Low-Power Differential Line Driver/Receiver Pair
5	5	SN75LBC180	Low-Power Differential Line Driver/Receiver Pair
21	5	SN75ALS181	Differential Driver and Receiver Pair
42	5	SN75176	Differential Bus Transceiver
57	5	SN75179	Differential Driver/Receiver Pair
70	5	SN75176	Differential Bus Transceiver
23	5	SN75176	Differential Bus Transceiver
1.5	5	SN75176	Differential Bus Transceiver
35	5	SN75176	Differential Bus Transceiver
12	5	SN75176	Transient Voltage Suppression Differential Transceiver
80	5	MC34050	Dual Differential Driver/Receiver Pairs
80	5	MC34051	Dual Differential Driver/Receiver Pairs
5	5	MC34050	Dual Differential Drivers and Receivers
35	5	MC34050	Dual Differential Drivers/Receivers
35	5	MC34051	Dual Differential Drivers/Receivers
69	5	SN75ALS170	Triple Differential Bus Transceiver
69	5	SN75ALS171	Triple Differential Bus Transceiver
69	5	SN75ALS170	Triple Differential Bus Transceiver
69	5	SN75ALS171	Triple Differential Bus Transceiver
7	5	AM26LS31	Quadruple Low-Power Differential Line Driver
7	5	MC3487	Quadruple Low-Power Differential Line Driver
36	5	AM26LS31	Quadruple Differential Line Driver
36	5	MC3487	Quadruple Differential Line Driver
38	5	AM26LS31	Quadruple Differential Line Driver
38	5	MC3487	Quadruple Differential Line Driver
72	5	SN75LBC970	SCSI Differential Converter-Control
4	5	SN75LBC971	SCSI Differential Converter-Data Product Preview
60	5	SN75LBC976	9-Channel Differential Transceiver
7	5	SN75LBC978	9-Channel Differential Transceiver
33	5	SN75LBC968	9-Channel Bus Transceiver with Active Termination

Transmitters & Receivers—TIA/EIA-232-F Standard

Device	Drivers/Receivers Per Package		Drivers/Receivers t_{pd} (ns)		I_{CC} All		Supply	I_{CC} (mA)	Channels (mA) max	Voltage(s) (V) typ	Description
	Drivers	Receivers	Drivers	Receivers	Footprint	I_{CC} (mA)					
MC1489	0/4		NA/85		MC1489	20		26	5		Quadruple Line Receiver
MC1489A	0/4		NA/85		MC1489	20		26	5		Quadruple Line Receiver
SN75154	0/4		11/NA		SN75154	20		35	5 or 12		Quadruple Differential Line Receiver
SN75189	0/4		NA/85		MC1489	20		26	5		Quadruple Line Receiver
SN75189A	0/4		NA/85		MC1489	20		26	5		Quadruple Line Receiver
SN75C189	0/4		NA/6000		MC1489	0.42		0.7	5		Quadruple Low-Power Line Receiver
SN75C189A	0/4		NA/6000		MC1489	0.42		0.7	5		Quadruple Low-Power Line Receiver
SN75155	1/1		480/245		SN75155	10.4		14	± 12		Line Driver/Receiver
UA9636A	2/0		NA/		UA9636	13		18	± 12		Dual Line Driver with Adjustable Slew Rate
SN75150	2/0		60/NA		SN75150	10		22	± 12		Dual Line Driver, Multiple Supplies Req'd
MAX232	2/2		NA/500		MAX232	8		10	5		Dual EIA-232 Driver/Receiver
TL145406	3/3		500/425		MC14506	13.2		20	$\pm 12, 5$		Triple RS-232 Drivers/Receivers
SN75C1406	3/3		3500/4000		MC14506	0.32		0.45	$\pm 12, 5$		Triple Low-Power Drivers/Receivers
GD75232	3/5		500/500		GD75232	20		20	$\pm 12, 5$		Multiple RS-232 Drivers/Receivers
SN75185	3/5		500/500		SN75185	30		30	$\pm 12, 5$		Multiple RS-232 Drivers/Receivers, Multiple Supplies Req'd
SN75LV4737A	3/5		850/200		SN75LV4737A	12		20.7	3 or 5		3.3-V/5-V Multichannel RS-232 Line Driver/Receiver
SN75LBC187	3/5		1250/1250		SN75LBC187	15		30	5		Multichannel EIA-232 Driver/Receiver with Charge Pump
SN75LPI185A	3/5		1600/900		SN75LPI185			1	$\pm 12, 5$		Low-Power Multiple RS-232 Drivers/Receivers
SN75LPE185	3/5		1600/900		SN75LPE185			1	$\pm 12, 5$		Low-Power Multiple Drivers/Receivers with Enable
SN75C185	3/5		3500/4000		SN75C185			0.75	$\pm 12, 5$		Low-Power Multiple Drivers/Receivers
LT1030	4/0		NA/		LT1030 68	0.5		1	± 5		Quadruple Low-Power Line Driver
MC1488	4/0		350/NA		MC1488	4.5		25	± 9		Quadruple Line Driver
SN75188	4/0		350/NA		MC1488	4.5		25	± 9		Quadruple Line Driver
SN75C188	4/0		3500/NA		MC1488	0.09		0.16	± 12		Quadruple Low-Power Line Driver
SN75186	4/4		800/2000		SN75186	2.5		8.1	5 or 12		Quadruple Driver/Receiver with Loopback
SN75C1154	4/4		2500/3000		SN75C1154	0.51		1.1	5 or 12		Quadruple Low-Power Drivers/Receivers
SN75LBC241	4/5		NA/500		MAX241	4		8	5		Low-Power LinBICMOS Multiple Drivers/Receivers
GD75323	5/3		500/500		GD75323			32	$\pm 12, 5$		Multiple RS-232 Drivers/Receivers
SN75196	5/3		500/500		SN75196			20	$\pm 12, 5$		Multiple RS-232 Driver/Receiver

Transmitters & Receivers—TIA/EIA-422-B Standard

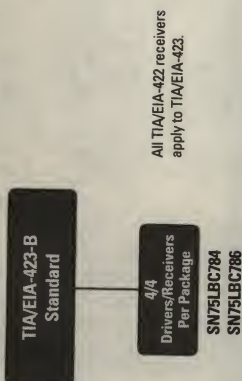


*Similar to 422
†Please refer to commercial version SN75....

Device	Drivers/ Receivers Per Package	Drivers/ Receivers t_{pd} (ns) typ	I_{CC} (mA) typ	I_{CC} All Channels (mA) max	Supply Voltage(s) (V) typ	Footprint	Description
SN75157	0/2	NA/25	35	50	5	SN75157	Dual Differential Line Receiver
UA9637A	0/2	NA/25	35	50	5	UA9637	Dual Differential Line Receiver
UA9639	0/2	NA/85	35	50	5	UA9639	Dual Differential Line Receiver
SN75146	0/2	NA/300	35	50	5	UA9637	Dual Differential Line Receiver
AM26LV32	0/4	NA/20	8	17	3.3	AM26LV32	Low-Voltage High-Speed Quadrate Differential Line Receiver
SN75ALS193	0/4	NA/22	22	35	5	AM26LS32	Quadrate Differential Line Receiver
SN75ALS195	0/4	NA/22	22	35	5	MC3486	Quadrate Differential Line Receiver
SN75ALS197	0/4	NA/22	22	35	5	MC3486	Quadrate Differential Line Receiver
SN75ALS199	0/4	NA/22	22	35	5	MC3486	Quadrate Differential Line Receiver
AM26C32	0/4	NA/27	10	15	5	AM26LS32	Quadrate Differential Line Receiver
SN75ALS173	0/4	NA/27	16	24	5	AM26LS32	Quadrate Differential Line Receiver
SN75ALS175	0/4	NA/27	16	24	5	MC3486	Quadrate Differential Line Receiver
SN75LBC173	0/4	NA/30	11	20	5	AM26LS32	Quadrate Low-Power Differential Line Receiver
SN75LBC175	0/4	NA/30	11	20	5	MC3486	Quadrate Low-Power Differential Line Receiver
AM26LS32A	0/4	NA/35	52	70	5	AM26LS32	Quadrate Differential Line Receiver
AM26LS33A	0/4	NA/35	52	70	5	AM26LS32	Quadrate Differential Line Receiver
MC3486	0/4	NA/35	52	85	5	MC3486	Quadrate Differential Line Receiver with 3-State Outputs
SN75173	0/4	NA/35	70	70	5	AM26LS32	Quadrate Differential Line Receiver
SN75175	0/4	NA/35	70	70	5	MC3486	Quadrate Differential Line Receiver
SN75ALS176A	1/1	7/18	23	30	5	SN75176	Differential Bus Transceiver
SN75ALS176B	1/1	8/16.5	23	30	5	SN75176	Differential Bus Transceiver
SN75ALS176	1/1	8/19	23	30	5	SN75176	Differential Bus Transceiver
SN75ALS180	1/1	13/19	25	30	5	SN75ALS180	Differential Driver/Receiver Pair
SN75176B	1/1	22/35	42	70	5	SN75176	Differential Bus Transceiver
SN75179B	1/1	22/35	57	70	5	SN75179	Differential Driver/Receiver Pair
SN95176B	1/1	22/35	70	70	5	SN75176	Differential Bus Transceiver
TL3695	1/1	22/37	23	50	5	SN75176	Differential Bus Transceiver
SN75176A	1/1	60/35	35	50	5	SN75176	Differential Bus Transceiver

TIA/EIA-422-B Standard (Continued)

Device	Drivers/ Receivers Per Package	Drivers/ Receivers I_{DD} (mA) typ	I_{CC} (mA) typ	I_{CC} All Channels (mA) max	Supply Voltage(s) (V) typ	Footprint	Description
SN75ALS191	2/0	7/NA	32	40	5	UA9638	Dual Differential Line Driver
UA9638	2/0	20/NA	45	65	5	UA9638	Dual High-Speed Differential Line Driver
SN75158	2/0	25/NA	37	50	5	SN75158	Dual Differential Line Driver
SN75159	2/0	25/NA	47	65	5	SN75159	Dual Differential Line Driver with 3-State Outputs
SN751177	2/2	NA/35	80	110	5	MC34050	Dual Differential Driver/Receiver Pairs
SN751178	2/2	NA/35	80	110	5	MC34051	Dual Differential Drivers/Receivers
SN75C1167	2/2	12/27	5	9	5	MC34050	Dual Differential Drivers/Receivers
SN75C1168	2/2	12/27	5	9	5	MC34051	Dual Differential Drivers/Receivers
SN75ALS1177	2/2	22/37	35	50	5	MC34050	Dual Differential Drivers/Receivers
SN75ALS1178	2/2	22/37	35	50	5	MC34051	Dual Differential Drivers/Receivers
SN75ALS170A	3/3	10.5/16.5		90	5	SN75ALS170	Triple Differential Bus Transceiver
SN75ALS171A	3/3	11/16		90	5	SN75ALS171	Triple Differential Bus Transceiver
SN75ALS170	3/3	13/19	69	90	5	SN75ALS170	Triple Differential Bus Transceiver
SN75ALS171	3/3	13/19	69	90	5	SN75ALS171	Triple Differential Bus Transceiver
AM26C31	4/0	12/NA	1.5	3	5	AM26LS31	Quadrate Differential Line Driver
AM26LV31	4/0	12/NA		0.1	3.3	AM26LS31	Low-Voltage High-Speed Quadrate Differential Line Driver
SN75ALS192	4/0	14/NA	26	45	5	AM26LS31	Quadrate Differential Line Driver
SN75ALS194	4/0	14/NA	26	45	5	MC3487	Quadrate Differential Line Driver
AM26LS31	4/0	20/NA	32	80	5	AM26LS31	Quadrate Differential Line Driver
MC3487	4/0	20/NA		85	5	MC3487	Quadrate Differential Line Driver
SN75ALS172A	4/0	22/NA	36	55	5	AM26LS31	Quadrate Differential Line Driver
SN75ALS174A	4/0	22/NA	36	55	5	MC3487	Quadrate Differential Line Driver
SN75172	4/0	65/NA	38	60	5	AM26LS31	Quadrate Differential Line Driver
SN75174	4/0	65/NA	38	60	5	MC3487	Quadrate Differential Line Driver



Device	Drivers/ Receivers Per Package	Receivers t_{pd} (ns) typ	I_{CC} (mA) typ	I_{CC} All Channels (mA) max	Supply Voltages (V)		Footprint	Description
					typ	max		
SN75LC784	4/4	1000	60	12	± 12		SN75LC784	Quadruple RS-423-B Driver/Receiver
SN75LC786	4/4	1000	60	12	± 12		SN75LC784	Quadruple RS-423-B Driver/Receiver with Loopback

Transmitters & Receivers—IEEE Std. 488 (GPIB)

IEEE Std. 488
(GPIB)

8/8
Drivers/Receivers
Per Package

SN75160B

SN75161B

SN75162B

SN75ALS160*

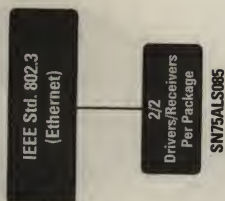
SN75ALS161*

SN75ALS162

* The devices are suitable for use for IEEE Standard 488 applications to the extent of the operating conditions and characteristics specified in the data sheet.

Device	Driver/Receiver Pins/Per Package	Driver/Receiver t_{pd} (ns) typ	I_{CC} (mA) typ	I_{CC} All Channels (mA) max	Supply Voltage(s) (V) typ	Footprint	Description
SN75ALS161	8/8	20/14	55	75	5	SN75161	Octal General-Purpose Interface Bus Transceiver
SN75ALS162	8/8	20/14	55	75	5	SN75162	Octal General-Purpose Interface Bus Transceiver
SN75ALS160	8/8	20/18	52	80	5	SN75160	Octal General-Purpose Interface Bus Transceiver
SN75160B	8/8	20/22	85	110	5	SN75160	Octal General-Purpose Interface Bus Transceiver
SN75161B	8/8	20/35		110	5	SN75161	Octal General-Purpose Interface Bus Transceiver
SN75162B	8/8	20/35		110	5	SN75162	Octal General-Purpose Interface Bus Transceiver

Transmitters & Receivers—IEEE Std. 802.3 (Ethernet)



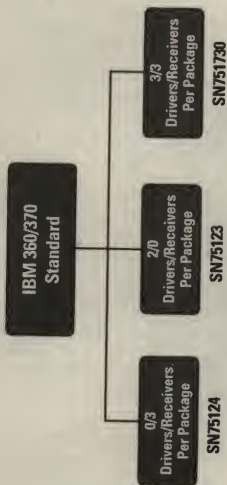
Device	Drivers/Receivers Per Package	Drivers/Receivers I_{OL} (mA)	Loc All Channels (mA) max	Supply Voltage (V) typ	Footprint	Description
SN75ALS085	2/2	15/15	225	5	SN75ALS085	LAN Access Unit Interface Dual Driver/Receiver

Transmitters & Receivers—IEEE Std. 896.1 (Futurebus)



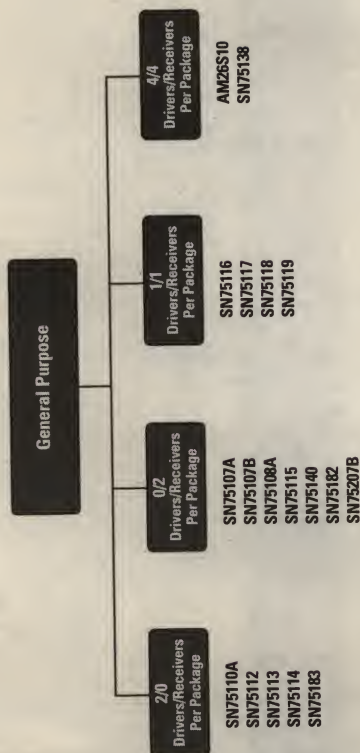
*The devices are suitable for use for IEEE Standard 896.1 applications to the extent of the operating conditions and characteristics specified in the data sheet.

Device	Drivers/ Receivers Per Package	Supply Voltage(s) (V) typ	I _{CC} All Channels (mA) max	Footprint	Description
SN75ALS057	4/4	5	40	DS3897	Trapezoidal-Waveform Interface Bus Transceiver
SN75ALS056	8/8	5	75	DS3896	Trapezoidal-Waveform Interface Bus Transceiver



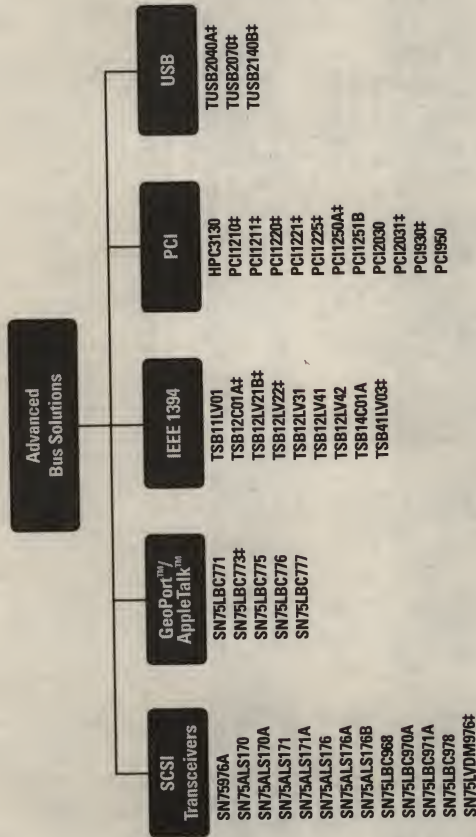
Device	Drivers/ Receivers Per Package	Drivers/ Receivers I_{FO} (mA) typ	loc All Channels (mA) max	Supply Voltage(s) (V) typ	Footprint	Description
SN75124	0/3	30	100	5	SN75124	Triple Line Receiver
SN75123	2/0	12	60	5	SN75123	Dual Line Driver
SN751730	3/3	18.5/19.5	80	5	SN751730	Triple Line Driver/Receiver

Transmitters & Receivers—General Purpose



Device	Driver/ Receiver Pin Package	Drivers Receivers I_{DD} (mA)	I_{CC} (mA)	I_{CC} All Channels (mA)	Supply Voltage(s) (V)	Footprint	Description
SN75107A	0/2	19	18	30	5	SN75107	Dual Line Receiver
SN75107B	0/2	19	18	30	5	SN75107	Dual Line Receiver
SN75108A	0/2	19	18	30	5	SN75107	Dual Line Receiver
SN75140	0/2	/35	20	35	5	SN75140	Dual Line Receiver, Single Ended
SN75207B	0/2	/35	18	30	-5	SN75107	Dual High-Sensitivity Line REC, Differential, $-6 < V_{CC} < 6V$
SN75182	0/2	/45	6.8	10.2	5	DS8820	Dual Differential Line Receiver, $-3 < V_{CC} < 3V$
SN75115	0/2	/75	32	50	5	SN75115	Dual Differential Line Receiver, $-15 < V_{CC} < 15V$
SN75116	1/1	/30	42	60	5	SN75116	Differential Line Transceiver, $-15 < V_{CC} < 15V$
SN75117	1/1	/30	42	60	5	SN75117	Differential Line Transceiver, $0 < V_{CC} < 6V$
SN75118	1/1	/30	42	60	5	SN75118	Differential Line Transceiver, $-15 < V_{CC} < 15V$
SN75119	1/1	/30	42	60	5	SN75119	Differential Line Transceiver, $0 < V_{CC} < 6V$
SN75110A	2/0	15/	23	35	-5	SN75110	Dual Line Driver, Differential, Current Mode, Multiple Supplies Req'd
SN75112	2/0	15/	25	40	-5	SN75112	Dual Line Driver, Differential, Current Mode, Multiple Supplies Req'd
SN75183	2/0	18/	10	18	5	DS8830	Quadruple Differential Line Driver, Voltage Mode
SN75113	2/0	30/	47	65	5	SN75113	Dual Differential Line Driver, Voltage Mode
SN75114	2/0	30/	37	50	5	SN75114	Dual Differential Line Driver, Voltage Mode
AM26S10	4/4		45	80	5	AM26S10	Quad Bus Transceiver, Single Ended, Open Collector
SN75138	4/4	24/15	50	65	5	SN75138	Quadruple Bus Transceiver, Single Ended, Open Collector

Advanced Bus Solutions



† Devices released since 1997 Designer's Guide

Advanced Bus Solutions—SCSI Transceivers

Devices	Driver/Receiver Per Package		Receivers I_{OL} (mA)	Footprint	I_{OL} (mA)	Description
	Driver	Receiver				
SN75ALS176A	1/1	7/18	7/18	SN75176	23	Differential Bus Transceiver
SN75ALS176B	1/1	8/16.5	8/16.5	SN75176	23	Differential Bus Transceiver
SN75ALS176	1/1	8/19	8/19	SN75176	23	Differential Bus Transceiver
SN75ALS170A	3/3	10.5/16.5	10.5/16.5	SN75ALS170	69	Triple Differential Bus Transceiver
SN75ALS171A	3/3	11/16	11/16	SN75ALS171	69	Triple Differential Bus Transceiver
SN75ALS170	3/3	13/19	13/19	SN75ALS170	69	Triple Differential Bus Transceiver
SN75ALS171	3/3	13/19	13/19	SN75ALS171	69	Triple Differential Bus Transceiver
SN75LDM976†	9/9	5.5/8.4	5.5/8.4	SN75LBC976	26	9-Channel Dual-Mode SCSI Transceiver
SN75LBC970A	9/9	8.5/8.5	8.5/8.5	SN75LBC970	72	SCSI Differential Converter-Control
SN75LBC971A	9/9	8.5/8.5	8.5/8.5	SN75LBC971	4	SCSI Differential Converter-Data
SN75976A	9/9	13.5/16.5	13.5/16.5	SN75LBC976	60	9-Channel Differential Transceiver
SN75LBC978	9/9	26.4/30.7	26.4/30.7	SN75LBC978	7	9-Channel Differential Transceiver
SN75LBC968	9/9	45/25	45/25	SN75LBC968	33	9-Channel Bus Transceiver with Active Termination

† Devices released since 1987 Designer's Guide

Advanced Bus Solutions—GeoPort™/AppleTalk™

Devices	Supply Voltage(s) (V)		Description
	typ	typ	
SN75LBC771	±5	GeoPort Transceiver	
SN75LBC773†	±5	GeoPort Transceiver	
SN75LBC775	5	Single-Chip AppleTalk/LocalTalk Transceiver	
SN75LBC776	5	Single-Chip GeoPort Transceiver	
SN75LBC777	5	Single-Chip GeoPort/AppleTalk Transceiver	

† Devices released since 1987 Designer's Guide

Advanced Bus Solutions—IEEE 1394

Device	Supply Voltage(s) (V)		Description
	typ	typ	
TSB11LV01	3.3	3.3	Single 3-V 1-Port Cable Transceiver/Arbiter
TSB12LV21B†	3.3	3.3	PCI to 1394 Link Layer Controller w/2k FIFOs
TSB12LV22†	3.3	3.3	Open Host Controller Interface (OHCI) 1394 Link Layer Controller
TSB12LV31	3.3	3.3	General Purpose Link-Layer Controller
TSB12LV41	3.3	3.3	Consumer Electronics 1394 Link Layer Controller w/MPPEG2 Packetization
TSB12LV42	3.3	3.3	Consumer Electronics 1394 Link Layer Controller w/DV Packetization
TSB41LV03†	3.3	3.3	3 Port 100/200/400Mbps Cable Transceiver/Arbiter
TSB12C01A	5	5	High-Speed Serial-Bus Link-Layer Controller
TSB14C01A†	5	5	Single-Port Backplane Physical Layer Transceiver

† Devices released since 1987 Designer's Guide

IrDA UARTs

Device	Device Type	Description
TIR1000	N/A	Standalone IrDA Encoder & Decoder
TIR2000†	N/A	High-Speed IrDA Compliant Controller
TL16PIR552	Dual	Asynchronous Communications Element (16-Byte FIFOs, Selectable IR & 1284 Modes)

† Devices released since 1997 Designer's Guide

PCMCIA UARTs

Device	Device Type	Description
TL16PC564B	Single	Asynchronous Communications Element (64-Byte FIFOs, PCMCIA Interface)

Plug-n-Play (PnP) UARTs

Device	Device Type	Description
TL16PNP100A	N/A	Standalone PnP Controller that Supports Two Logical Devices
TL16PNP200A	N/A	Standalone PnP Controller that Supports Five Logical Devices
TL16PNP550A	Single	Asynchronous Communications Element (16-Byte FIFOs, Auto Flow Control, PnP Controller)

Power Supply Products

Contents

New Product Previews	4-2
Product Decision Trees and Selection Guides	
Power Supply Products Overview	4-3
Voltage Regulators	4-4
PWM Controllers & DC/DC Converters	4-11
Processor Power Supply Controllers	4-14
Voltage References	4-15
Microprocessor Supervisory Circuits (SVS)	4-16
Distribution Switches	4-19
MOSFET Drivers	4-22

For technical assistance, requesting datasheets or samples, see Contact Information in Appendix A.

Two other resources for product information are:

- 1) the InfoNavigator CD-ROM (literature # SLYC005B)
- 2) the Semiconductor products category at the TI web site www.ti.com

Power Supply New Product Previews

The following new devices are expected to be released in the near future. For more information, please refer to the InfoNavigator CD-ROM, literature number SLYC005B.

Device	Description
--------	-------------

Distribution Switches

PCMCIA

TPS2212	200-mA version of TPS2211
TPS2214	24-pin version of TPS2216
TPS2216	Independent VPP/VCC 125-mΩ switch

USB

TPS2043	135-mΩ, 500-mA, N-Channel Triple w/OC rpt, -EN
TPS2045	135-mΩ, 200-mA, N-Channel Single w/OC rpt, -EN
TPS2046	135-mΩ, 200-mA, N-Channel Dual w/OC rpt, -EN
TPS2047	135-mΩ, 200-mA, N-Channel Triple w/OC rpt, -EN
TPS2048	135-mΩ, 200-mA, N-Channel Quad w/OC rpt, -EN
TPS2053	135-mΩ, 500-mA, N-Channel Triple w/OC rpt, +EN
TPS2055	135-mΩ, 200-mA, N-Channel Single w/OC rpt, +EN
TPS2056	135-mΩ, 200-mA, N-Channel Dual w/OC rpt, +EN
TPS2057	135-mΩ, 200-mA, N-Channel Triple w/OC rpt, +EN
TPS2058	135-mΩ, 200-mA, N-Channel Quad w/OC rpt, +EN

General Purpose

TPS2020	
TPS2021	50-mΩ, 600-mA, N-Channel Single w/OC rpt, -EN
TPS2022	50-mΩ, 1.0-mA, N-Channel Single w/OC rpt, -EN
TPS2023	50-mΩ, 1.5-mA, N-Channel Single w/OC rpt, -EN
TPS2024	50-mΩ, 2.0-mA, N-Channel Single w/OC rpt, -EN
TPS2030	50-mΩ, 200-mA, N-Channel Single w/OC rpt, +EN
TPS2031	50-mΩ, 600-mA, N-Channel Single w/OC rpt, +EN
TPS2032	50-mΩ, 1.0-mA, N-Channel Single w/OC rpt, +EN
TPS2033	50-mΩ, 1.5-mA, N-Channel Single w/OC rpt, +EN
TPS2034	50-mΩ, 2.0-mA, N-Channel Single w/OC rpt, +EN
TPS2010A	50-mΩ, 200-mA, N-Channel Single, -EN
TPS2011A	50-mΩ, 600-mA, N-Channel Single, -EN
TPS2012A	50-mΩ, 1.0-mA, N-Channel Single, -EN
TPS2013A	50-mΩ, 1.5-mA, N-Channel Single, -EN
TPS2100	250-mΩ N, 4.5-Ω P, 2 in, 1 out, SOT-23, -EN (V_{AUX})
TPS2101	250-mΩ N, 4.5-Ω P, 2 in, 1 out, SOT-23, +EN (V_{AUX})

MOSFET Drivers

TPS2830	High- and Low-Side Drivers
TPS2831	High- and Low-Side Driver, Inverted
TPS2832	High and Low Drive without Crowbar
TPS2833	High and Low Drive without Crowbar, Inverted

Device	Description
--------	-------------

Low Dropout Voltage Regulators

SOT-23 Packaging

TPS76130	3.0-V, 100-mA Output Current
TPS76132	3.2-V, 100-mA Output Current
TPS76133	3.3-V, 100-mA Output Current
TPS76138	3.8-V, 100-mA Output Current
TPS76150	5.0-V, 100-mA Output Current
TPS76301	Adjustable (2.7-V to 10-V), 150-mA Output Current
TPS76316	1.6-V, 150-mA Output Current
TPS76318	1.8-V, 150-mA Output Current
TPS76325	2.5-V, 150-mA Output Current
TPS76327	2.7-V, 150-mA Output Current
TPS76328	2.8-V, 150-mA Output Current
TPS76330	3.0-V, 150-mA Output Current
TPS76333	3.3-V, 150-mA Output Current
TPS76350	5.0-V, 150-mA Output Current
TPS76425	2.5-V, 150-mA Output Current, Low Noise
TPS76427	2.7-V, 150-mA Output Current, Low Noise
TPS76428	2.8-V, 150-mA Output Current, Low Noise
TPS76430	3.0-V, 150-mA Output Current, Low Noise
TPS76433	3.3-V, 150-mA Output Current, Low Noise

Dual Outputs

TPS73HD325	3.3-V and 2.5-V, 750-mA Output Current Each
TPS73HD318	3.3-V and 1.8-V, 750-mA Output Current Each

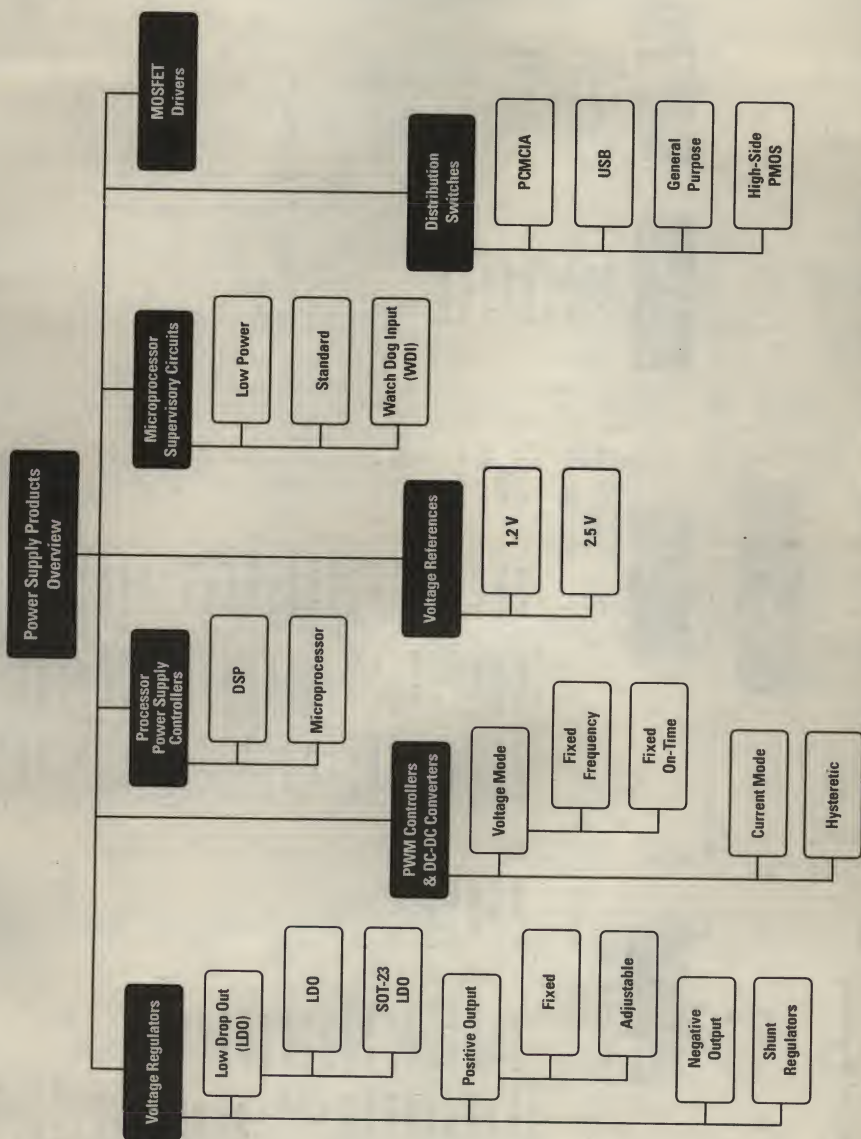
Single Output

TPS73H018	1.8-V, 750-mA Output Current
TPS72018	1.8-V, 250-mA Output Current
TPS72238	2.8-V, 250-mA Output Current

Web Location

Power Supply Products

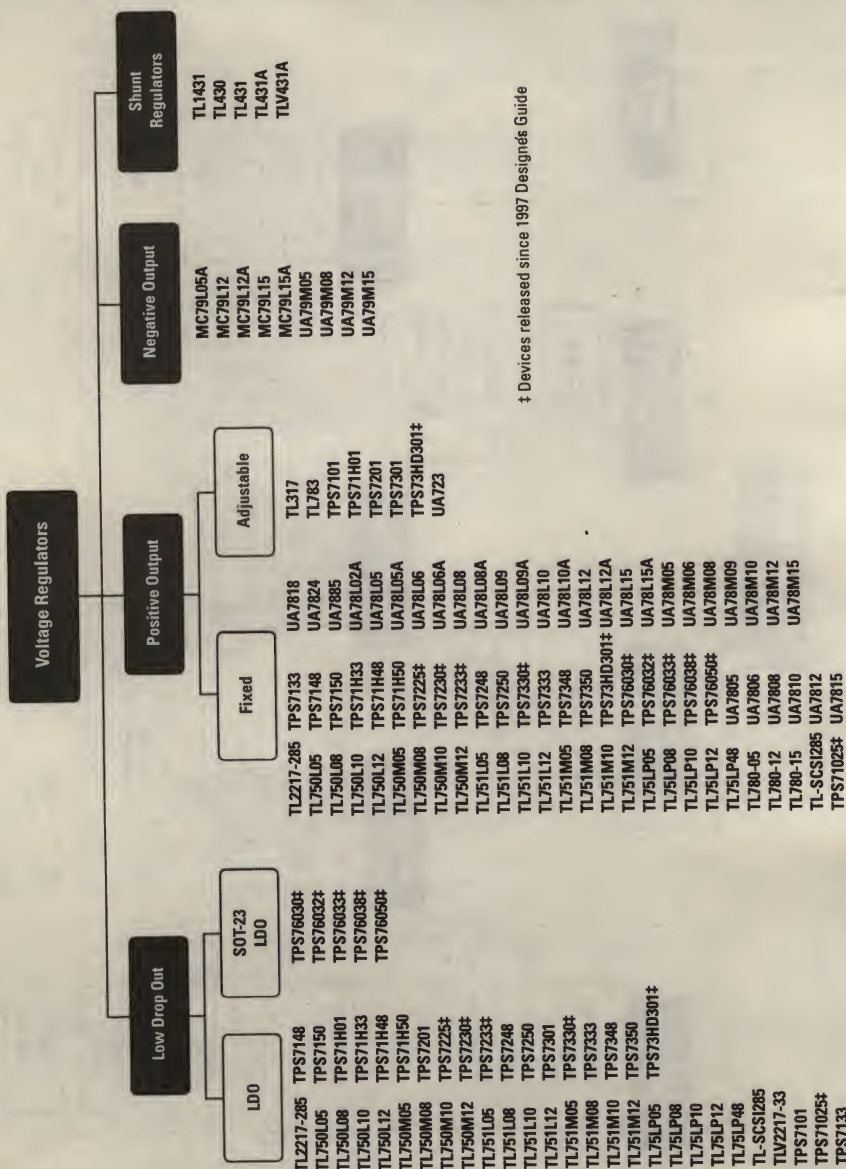
www.ti.com/sc/docs/msp/power/default.htm



Voltage Regulators

Decision Tree

Voltage Regulators



† Devices released since 1997 Designer's Guide

Low Dropout (LDO) Voltage Regulators

Device	V _A Fixed (V) typ	V _O Adjustable (V) typ	I _O (mA) max	V _{DO} (V) typ	I _q (mA) typ	Tol (%) max	V _I (V) max	Shutdown	SVS	Description
TPS7225†	2.5		250		0.180	2	10	Yes	No	Micropower, Very Low Dropout, Adjustable
TPS71025†	2.5		500	0.330	0.500	2	10	Yes	No	Low Dropout
TL-SCS285	2.85		500		0.7	26	1	5.5	No	Fixed, for SCSJ Termination
TL2217-285	2.85		500		1	26	1.5	5.5	No	Fixed, for SCSJ Termination
TPS7230†	3.0		250	0.390	0.900	2	10	Yes	No	Micropower, Very Low Dropout, Adjustable
TPS7330†	3.0		500	0.052	0.075	2	10	Yes	Yes	Integrated SVS
TPS7233†	3.3		250	0.14	0.18	2	10	Yes	No	Micropower, Very Low Dropout
TLV2217-33	3.3		500	0.4	0.5	19	1	12	No	Low Dropout, 3.3-V, Fixed
TPS7133	3.3		500	0.047	0.06	2	10	Yes	No	Lowest Dropout
TPS71H33	3.3		500	0.047	0.060	2	10	Yes	No	High Power Package
TPS7333	3.3		500	0.044	0.06	2	10	Yes	Yes	Integrated SVS
TPS73HD301†	3.3	1.2 to 9.75	750	0.353	0.600	1.1	3	10	Yes	Dual-Output LDO
TPS7248	4.85		250	0.09	0.1	1.155	2	10	Yes	Micropower, Very Low Dropout
TL75LP48	4.85		300	0.12	0.2	4	2	23	Yes	Low Dropout
TPS7348	4.85		500	0.028	0.037	0.34	2	10	Yes	Integrated SVS
TPS7148	4.85		500	0.030	0.037	0.285	2	10	Yes	Lowest Dropout
TPS71H48	4.85		500	0.030	0.037	0.285	2	10	Yes	High Power Package
TL750L05	5.0		150	0.2	0.6	10	4	26	No	Low Dropout, Low Current
TL751L05	5.0		150	0.2	0.6	10	4	26	Yes	Low Dropout, Low Current, with Shutdown
TPS7250	5.0		250	0.76	0.85	0.155	2	10	Yes	Micropower, Very Low Dropout
TL75LP05	5.0		300	0.12	0.2	4	2	23	Yes	Low Dropout
TPS7150	5.0		500	0.027	0.032	0.285	2	10	Yes	Lowest Dropout
TPS71H50	5.0		500	0.027	0.033	0.285	2	10	Yes	High Power Package
TPS7350	5.0		500	0.027	0.035	0.34	2	10	Yes	Integrated SVS
TL750M05	5.0		750	0.5	0.06	60	2	26	No	Low Dropout, High Current
TL751M05	5.0		750	0.5	0.06	60	2	26	Yes	Low Dropout, High Current, with Shutdown
TL750L08	8.0		150	0.2	0.7	10	4	26	No	Low Dropout, Low Current
TL751L08	8.0		150	0.2	0.7	10	4	26	Yes	Low Dropout, Low Current, with Shutdown
TL75LP08	8.0		300	0.12	0.2	4	2	23	Yes	Low Dropout
TL750M08	8.0		750	0.5	0.7	60	2	26	No	Low Dropout, High Current
TL751M08	8.0		750	0.5	0.7	60	2	26	Yes	Low Dropout, High Current, with Shutdown
TL750L10	10.0		150	0.2	0.8	10	4	26	No	Low Dropout, Low Current

† Devices released since 1997 Designer's Guide

Low Dropout (LDO) Voltage Regulators (Continued)

Device	V_{I2} phen (V) typ	V_O adjustable (V) typ	I_O (mA) max	V_{DO} (V) typ	V_{DO} (V) max	I_O (mA) typ	Tol (%) max	V_{IN} (V) max	Shutdown	SVS	Description
TL751L10	10.0		150	0.2	0.8	10	4	26	Yes	No	Low Dropout, Low Current, with Shutdown
TL751LP10	10.0		300	0.12	0.2	4	2	23	Yes	No	Low Dropout
TL750M10	10.0		750	0.5	0.8	60	2	26	No	No	Low Dropout, High Current
TL751M10	10.0		750	0.5	0.8	60	2	26	Yes	No	Low Dropout, High Current, with Shutdown
TL750L12	12.0		150	0.2	0.9	10	4	26	No	No	Low Dropout, Low Current
TL751L12	12.0		150	0.2	0.9	10	4	26	Yes	No	Low Dropout, Low Current, with Shutdown
TL751LP12	12.0		300	0.12	0.2	4	2	23	Yes	No	Low Dropout
TL750M12	12.0		750	0.5	0.9	60	2	26	No	No	Low Dropout, High Current
TL751M12	12.0		750	0.5	0.9	60	2	26	Yes	No	Low Dropout, High Current
TPS7201		1.2 to 9.75	250	0.16	0.27	0.155	3	10	Yes	No	Low Dropout, High Current, with Shutdown
TPS7101		1.2 to 9.75	500	0.052	0.085	0.285	3	10	Yes	No	Micropower, Very Low Dropout, Adjustable
TPS71H01		1.2 to 9.75	500	0.052	0.085	0.285	3	10	Yes	No	Lowest Dropout, Adjustable
TPS7301		1.2 to 9.75	500	0.052	0.085	0.34	3	10	Yes	Yes	High Power Package Integrated SVS

SOT-23 Low Dropout (LDO) Voltage Regulators

Device	V_{I2} (V) typ	I_O (mA) max	V_{DO} (V) typ	V_{DO} (V) max	I_O (mA) typ	Tol (%) max	V_{IN} (V) max	Shutdown	Description
TPS760301	3.0	50	0.120	0.180	0.850	2.3	16	Yes	Low-Power 50-mA
TPS760321	3.2	50	0.120	0.180	0.850	3.1	16	Yes	Low-Power 50-mA
TPS760331	3.3	50	0.120	0.180	0.850	3.0	16	Yes	Low-Power 50-mA
TPS760381	3.8	50	0.120	0.180	0.850	2.6	16	Yes	Low-Power 50-mA
TPS760501	5.0	50	0.120	0.180	0.850	2.0	16	Yes	Low-Power 50-mA

† Devices released since 1997 Designer's Guide

Fixed Positive-Output Voltage Regulators

Device	V_i (V) typ	V_o Adjustable (V) typ	V_o (V) max	I_o (mA) typ	I_o (mA) max	$T_{\theta JA}$ (°C) max	V_{DS} (V) typ	V_{DS} (V) max	Shutdown	SVS	Description
UA78L02A	2.00		20	100	3.6	5	1.7	3	No	No	General Purpose, Low Current
TPS7225†	2.50		10	250	0.180	2	0.560	1.1	Yes	No	Micropower, Very Low Dropout
TPS71025†	2.50		10	500	0.290	2	0.330	0.500	Yes	No	Low Dropout
TL-SCSI285	2.85		5.5	500	26	1		0.7	No	No	Fixed, for SCSI Active Termination
TL2217-285	2.85		5.5	500	26	1.5		1	No	No	Fixed, for SCSI Active Termination
TPS76030†	3.0		16	50	0.850	2.3	0.120	0.180	Yes	No	Low-Power 50-mA
TPS7230†	3.0		10	250	0.180	2	0.390	0.900	Yes	No	Micropower, Very Low Dropout
TPS7330†	3.0		10	500	0.34	2	0.052	0.075	Yes	Yes	Low Dropout with Integrated SVS
TPS76032†	3.20		16	50	0.850	3.1	0.120	0.180	Yes	No	Low-Power 50-mA
TPS76033†	3.30		16	50	0.850	3.0	0.120	0.180	Yes	No	Low-Power 50-mA
TPS7233	3.30		10	250	0.155	2	0.14	0.18	Yes	No	Micropower, Very Low Dropout
TPS7133	3.30		10	500	0.285	2	0.047	0.06	Yes	No	Lowest Dropout
TPS71H33	3.30		10	500	0.285	2	0.047	0.060	Yes	No	Lowest Dropout
TPS7333	3.30		10	500	0.34	2	0.044	0.06	Yes	Yes	Lowest Dropout PMOS with Integrated SVS
TPS73HD301†	3.30	1.2 to 9.75	10	750	1.1	3	0.353	0.600	Yes	Yes	Dual-Output
TPS76038†	3.80		16	50	0.850	2.6	0.120	0.180	Yes	No	Low-Power 50-mA
TPS7248	4.85		10	250	0.155	2	0.09	0.1	Yes	No	Micropower Very Low Dropout
TL75LP48	4.85		23	300	4	2	0.12	0.2	Yes	No	Low Dropout
TPS7148	4.85		10	500	0.285	2	0.030	0.037	Yes	No	Lowest Dropout
TPS71H48	4.85		10	500	0.285	2	0.030	0.037	Yes	No	Lowest Dropout
TPS7348	4.85		10	500	0.34	2	0.028	0.037	Yes	Yes	Lowest Dropout PMOS with Integrated SVS
TPS76050†	5.0		16	50	0.850	2.0	0.120	0.180	Yes	No	Low-Power 50-mA
UA78L05	5.0		20	100	3.8	10	2	3	No	No	General Purpose, Low Current
UA78L05A	5.0		20	100	3.8	5	1.7	3	No	No	General Purpose, Low Current
TL750L05	5.0		26	150	10	4	0.2	0.6	No	No	Low Dropout, Low Current
TL751L05	5.0		26	150	10	4	0.2	0.6	Yes	No	Low Dropout, Low Current with Shutdown
TPS7250	5.0		10	250	0.155	2	0.76	0.85	Yes	No	Micropower Very Low Dropout
TL75LP05	5.0		23	300	4	2	0.12	0.2	Yes	No	Low Dropout
TPS7150	5.0		10	500	0.285	2	0.027	0.033	Yes	No	Lowest Dropout
TPS71H50	5.0		10	500	0.285	2	0.027	0.033	Yes	No	Lowest Dropout
TPS7350	5.0		10	500	0.34	2	0.027	0.035	Yes	Yes	Lowest Dropout PMOS with Integrated SVS
UA78M05	5.0		25	500	4.5	4	2	3	No	No	General Purpose, Medium Current
TL750M05	5.0		26	750	60	2	0.5	0.6	No	No	Low Dropout, High Current
TL751M05	5.0		26	750	60	2	0.5	0.6	Yes	No	Low Dropout, High Current
TL780-05	5.0		25	1500	5	1	2	3	No	No	High Current Upgrade for UA7805
UA7805	5.0		25	1500	4.2	4	2	3	No	No	General Purpose, High Current

† Devices released since 1987 Designer's Guide

Fixed Positive-Output Voltage Regulators (Continued)

Device	V _O (V) typ	V _{IN} (V)		I _O (mA) max	I _Q (mA) typ	Tol (%) max	V _{DO} (V)		Shutdown	SVS	Description
		Adjustable	typ				typ	max			
UA78L06A	6.0			100	3.9	5	1.7	3	No	No	General Purpose, Low Current
UA78L06	6.0			100	3.9	10	1.7	3	No	No	General Purpose, Low Current
UA78M06	6.0			500	4.5	4	2	3	No	No	General Purpose, Medium Current
UA7806	6.0			1500	4.3	4	2	3	No	No	General Purpose, High Current
UA78L08	8.0			100	4	10	1.7	3	No	No	General Purpose, Low Current
UA78L08A	8.0			100	4	5	1.7	3	No	No	General Purpose, Low Current
TL750L08	8.0			26	150	10	0.2	0.7	No	No	Low Dropout, Low Current
TL751L08	8.0			26	150	10	0.2	0.7	Yes	No	Low Dropout, Low Current with Shutdown
TL75LP08	8.0			23	300	4	0.12	0.2	Yes	No	Low Dropout
UA78M08	8.0			25	500	4.6	2.5	3	No	No	General Purpose, Medium Current
TL750M08	8.0			26	750	60	0.5	0.7	No	No	Low Dropout, High Current
TL751M08	8.0			26	750	60	0.5	0.7	Yes	No	Low Dropout, High Current with Shutdown
UA7808	8.0			25	1500	4.3	2.5	3	No	No	General Purpose, High Current
UA7885	8.0			25	1500	4.3	2	3	No	No	General Purpose, High Current
UA78L09A	9.0			100	4.1	5	1.7	3	No	No	General Purpose, Low Current
UA78LD9	9.0			100	4.1	10	1.7	3	No	No	General Purpose, Low Current
UA78M09	9.0			26	500	4.6	2.5	3	No	No	General Purpose, Medium Current
UA78L10A	10.0			25	100	4.2	5	1.7	3	No	General Purpose, Low Current
UA78L10	10.0			25	100	4.2	10	1.7	3	No	General Purpose, Low Current
TL750L10	10.0			26	150	10	0.2	0.8	No	No	Low Dropout, Low Current
TL751L10	10.0			26	150	10	0.2	0.8	Yes	No	Low Dropout, Low Current with Shutdown
TL75LP10	10.0			23	300	4	0.12	0.2	Yes	No	Low Dropout
UA78M10	10.0			28	500	4.6	2.5	3	No	No	General Purpose, Medium Current
TL750M10	10.0			26	750	60	0.5	0.8	No	No	Low Dropout, High Current
TL751M10	10.0			26	750	60	0.5	0.8	Yes	No	Low Dropout, High Current with Shutdown
UA7810	10.0			28	1500	4.3	2.5	3	No	No	General Purpose, High Current
UA78L12	12.0			27	100	4.3	10	1.7	3	No	General Purpose, Low Current
UA78L12A	12.0			27	100	4.3	5	1.7	3	No	General Purpose, Low Current
TL750L12	12.0			26	150	10	0.2	0.9	No	No	Low Dropout, Low Current
TL751L12	12.0			26	150	10	0.2	0.9	Yes	No	Low Dropout, Low Current with Shutdown
TL75LP12	12.0			23	300	4	0.12	0.2	Yes	No	Low Dropout
UA78M12	12.0			30	500	4.8	2.5	3	No	No	General Purpose, Medium Current
TL750M12	12.0			26	750	60	0.5	0.9	No	No	Low Dropout, High Current
TL751M12	12.0			26	750	60	0.5	0.9	Yes	No	Low Dropout, High Current with Shutdown
TL780A-12	12.0			30	1500	5.5	1	2.5	3	No	High Current Upgrade for UA7812
UA7812	12.0			30	1500	4.3	2.5	3	No	No	General Purpose, High Current

Fixed Positive-Output Voltage Regulators (Continued)

Device	V_O (V) typ	V_O Adjustable (V) typ	V_{IN} max	I_O max	I_Q typ	Tol (%) max	V_{DO} (V) typ	max	Shutdown	SVS	Description
UA78L15	15.0		30	100	4.6	10	1.7	3	No	No	General Purpose, Low Current
UA78L15A	15.0		30	100	4.6	5	1.7	3	No	No	General Purpose, Low Current
UA78M15	15.0		30	500	4.8	4	2.5	3	No	No	General Purpose, Medium Current
TL780-15	15.0		30	1500	5.5	1	2.5	3	No	No	High Current Upgrade for UA7815
UA7815	15.0		30	1500	4.4	4	2.5	3	No	No	General Purpose, High Current
UA7818	18.0		33	1500	4.5	4	3	3	No	No	General Purpose, High Current
UA7824	24.0		38	1500	4.6	4	3	3	No	No	General Purpose, High Current

Adjustable Positive-Output Voltage Regulators

Device	V_O Range (V) max	V_{IN} (V) max	I_O max	I_Q (mA) typ	Tol (%) max	V_{DO} (V) typ	max	Shutdown	SVS	Description
TL317	1.2 to 32.0	35	100	1.5	4	2.5	3	No	No	General Purpose, Low Current, 3-Terminal
TPS7201	1.2 to 9.75	10	250	0.155	3	0.16	0.27	Yes	No	Micropower, Very Low Dropout
TPS7101	1.2 to 9.75	10	500	0.285	3	0.052	0.085	Yes	No	Lowest Dropout
TPS71H01	1.2 to 9.75	10	500	0.285	3	0.052	0.085	Yes	No	High Power Package
TPS7301	1.2 to 9.75	10	500	0.34	3	0.052	0.085	Yes	Yes	Integrated SVS
TPS73HD301†	1.2 to 9.75	10	750	1.1	3	0.353	0.600	Yes	Yes	Dual-Output
TL783	1.25 to 125.0	125	700	15	6	10	15	No	No	High Voltage, High Current
UA723	2 to 37	40	150	2.3	1	3	3	No	No	Precision

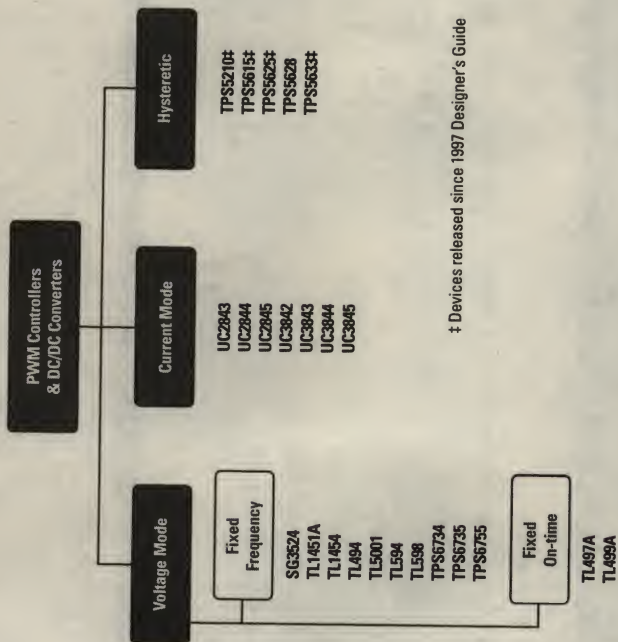
† Devices released since 1997 Designer's Guide

Fixed Negative-Output Voltage Regulators

Device	V_O (V) typ	V_{IN} (V) max	I_O (mA) max	I_Q (mA) typ	Tol (%) max	V_{CC} (V) typ	V_{CC} (V) max	Description
MC79L05A	-5.0	-20	100	5	5	2	3	Low Current
UA79M05	-5.0	-25	500	1	4	2	3	General Purpose, Medium Current
UA79M08	-8.0	-25	500	1	4	2.5	3	General Purpose, Medium Current
MC79L12A	-12.0	-27	100	5	5	2.5	3	Low Current
MC79L12	-12.0	-27	100	10	10	2.5	3	Low Current
UA79M12	-12.0	-30	500	1.5	4	2.5	3	General Purpose, Medium Current
MC79L15A	-15.0	-30	100	5	5	2.5	3	Low Current
MC79L15	-15.0	-30	100	10	10	2.5	3	Low Current
UA79M15	-15.0	-30	500	1.5	4	2.5	3	General Purpose, Medium Current

Shunt Voltage Regulators

Device	V_{ref} (V) typ	I_Z (μ A) min	V_O (mA) min	Tol (V) max	V_{IN} (%) min	V_{ref} (V) max	Temp Coeff (ppm/ $^{\circ}$ C) max	V_{ref} (V) typ	V_{ref} (V) max	typ	Description
TLV431A	1.24	100	100	15	V_{ref}	6	1	6	6	46	Low Voltage, Adjustable, Precision
TL1431	2.5	1000	1000	100	V_{ref}	36	0.4	36	36	30	Precision, Adjustable (Programmable)
TL431	2.5	1000	1000	100	V_{ref}	36	2	36	36	30	Adjustable, Precision
TL431A	2.5	1000	1000	100	V_{ref}	36	1	36	36	30	Adjustable, Precision
TL430	2.75	2000	2000	100	V_{ref}	30	9	30	30	120	Adjustable



† Devices released since 1997 Designer's Guide

Voltage Mode PWM Controllers & DC/DC Converters

Device	Shutdown	Pulse-by-Pulse I_{sense}	V_{in} Range (V)	Output Type	Output Current (mA)	Frequency (kHz)	Operating/Standby Current (mA)	Reference Voltage (V)	V_{ref} Tol (%)	Duty Cycle (%)	Under-voltage Lockout	Description
			typ		typ	max	typ	typ	typ	max		
Fixed Frequency												
SG3524	Yes	No	8 to 40	Single Switch	100	500	NA/8	5	8	90	No	Regulating Pulse-Width Modulator
TL1451A	No	No	3.6 to 50	Single Switch	20	500	1.7/1.3	2.5	4	100	Yes	Dual Pulse-Width-Modulation Control Circuit
TL1454	No	No	3.6 to 20	Totem Pole	±40	2000	3.5/3.1	1.25	2.5	100	Yes	Dual-Channel Pulse-Width-Modulation (PWM) Control Circuit
TL494	No	No	7 to 40	Single Switch	200	300	7.5/6	5	5	90	No	Pulse-Width-Modulation (PWM) Control Circuit
TL5001	No	No	3.6 to 40	Single Switch	20	400	1.1/1	1	5	100	Yes	Pulse-Width-Modulation (PWM) Control Circuit
TL594	No	No	7 to 40	Single Switch	200	300	12.4/9	5	1	90	Yes	Pulse-Width-Modulation (PWM) Control Circuit
TL598	No	No	7 to 40	Totem Pole	±250	300	15/NA	5	1	90	Yes	Pulse-Width-Modulation (PWM) Control Circuit
TPS6734	Yes	Yes	5 to 12	Single Switch	225	170	1.2/0.003	1.23	4		No	Fixed 12-V 120-mA Boost-Converter Supply
TPS6735	Yes	Yes	4 to 6.2	Single Switch	200	160	1.9/0.010	1.22	4		Yes	Fixed Negative 5-V 200-mA Inverting DC/DC Converter
TPS6755	Yes	Yes	2.7 to 9	Single Switch	200	160	1.9/0.010	1.22	4		No	Adjustable Inverting DC/DC Converter
Fixed On-Time												
TL497A	Yes	No	4.5 to 12	Single Switch	500	50	11/6	1.2	5		No	Switching Voltage Regulator
TL498A	No	No	1.1 to 35	Single Switch	500	40	1.8/NA	1.26	5		No	Wide-Range Power-Supply Controller

Current Mode PWM Controllers & DC/DC Converters

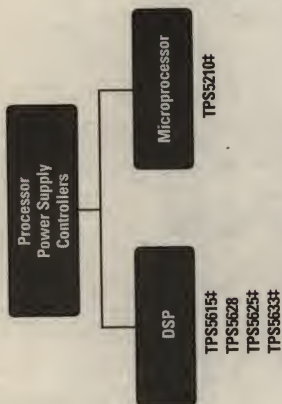
Device	Shutdown	Pulse-by-Pulse	V _{in} Range (V)	Output Current (mA)	Frequency (kHz)	Operating/Standby Current (mA)	Reference Voltage (V)	V _{ref} Tol (%)	Duty Cycle (%)	Under-voltage Lockout	Description
UC2843	No	Yes	30	±200	500	11/NA	5	1	97	Yes	Current-Mode PWM Controller
UC2844	No	Yes	30	±200	500	11/NA	5	1	97	Yes	Current-Mode PWM Controller
UC2845	No	Yes	30	±200	500	11/NA	5	1	97	Yes	Current-Mode PWM Controller
UC3842	No	Yes	30	±200	500	11/NA	5	2	97	Yes	Current-Mode PWM Controller
UC3843	No	Yes	30	±200	500	11/NA	5	2	97	Yes	Current-Mode PWM Controller
UC3844	No	Yes	30	±200	500	11/NA	5	2	97	Yes	Current-Mode PWM Controller
UC3845	No	Yes	30	±200	500	11/NA	5	2	97	Yes	Current-Mode PWM Controller

Hysteretic PWM Controllers & DC/DC Converters

Device	V _{in} (V)	V _o (V)	V _{ref} Tol (%)	Output Drive Current (A)	Dropout Compensation	Soft Start	Power Good	UVLO	OVP	SCP
TPS5210†	12 V & 5 V	Programmable 1.3 V to 3.5 V	±1%	2A	Yes	Yes	Yes	Yes	Yes	Yes
TPS5615†	12 V & 5 V	1.5 V	±1%	2A	No	Yes	Yes	Yes	Yes	Yes
TPS5628	12 V & 5 V	1.8 V	±1%	2A	No	Yes	Yes	Yes	Yes	Yes
TPS5625†	12 V & 5 V	2.5 V	±1%	2A	No	Yes	Yes	Yes	Yes	Yes
TPS5633†	12 V & 5 V	3.3 V	±1%	2A	No	Yes	Yes	Yes	Yes	Yes

† Devices released since 1997 Designer's Guide

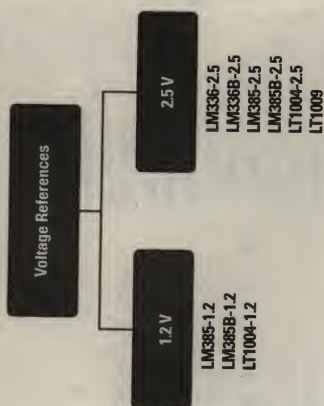
Processor Power Supply Controllers



† Devices released since 1997 Designer's Guide

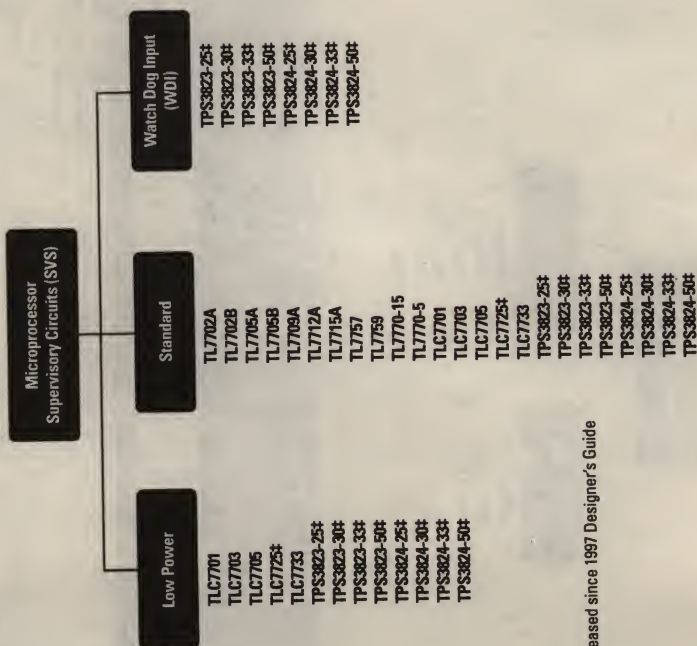
Device	V _{in} (V)		V _o (V)	V _{ref} Tol (%)	Output Drive Current (A)		Drop Compensation	Soft Start	Power Good	UVLO	OVP	OCP
	min	max	typ	max	min	max						
DSP												
TPS5615†	12 V & 5 V		1.5 V	±1%		2A	No	Yes	Yes	Yes	Yes	Yes
TPS5628	12 V & 5 V		1.8 V	±1%		2A	No	Yes	Yes	Yes	Yes	Yes
TPS5625†	12 V & 5 V		2.5 V	±1%		2A	No	Yes	Yes	Yes	Yes	Yes
TPS5633†	12 V & 5 V		3.3 V	±1%		2A	No	Yes	Yes	Yes	Yes	Yes
Microprocessor												
TPS5210†	12 V & 5 V		Programmable 1.3 V to 3.5 V	±1%		2A	Yes	Yes	Yes	Yes	Yes	Yes

† Devices released since 1997 Designer's Guide



Device	V _{ref} (V) typ	V _{ref} Tol (%) max	I _z (μ A) min	I _z (mA) max	Temp Coeff (ppm/°C) typ	Description
1.2 V						
LT1004-1.2	1.2	0.3	10	20	20	Micropower Integrated Precision Voltage Reference
LM385B-1.2	1.2	1	10	20	±20	Micropower Voltage Reference
LM385-1.2	1.2	2	10	20	±20	Micropower Voltage Reference
2.5 V						
LT1004-2.5	2.5	0.8	20	20	20	Micropower Integrated Precision Voltage Reference
LM336B-2.5	2.5	1	400	10	N/A	Precision Voltage Reference
LM385B-2.5	2.5	1.5	20	20	±20	Micropower Voltage Reference
LT1009	2.5	2	400	20	15	2.5-V Integrated Reference Circuit
LM385-2.5	2.5	3	20	20	±20	Micropower Voltage Reference
LM336-2.5	2.5	4	400	10	N/A	2.5-V Integrated Reference Circuit

Microprocessor Supervisory Circuits (SVS)



† Devices released since 1997 Designer's Guide

Low Power Microprocessor Supervisory Circuits (SVS)

Device	V _{CC} (V) typ	V _I (V) typ	V _I Tol (%) max	I _{CC} (mA) max	V _{IN} (V) min	SVS	Time Delay	Complementary Outputs	WDI	Description
TPS3823-25†	2.50	2.25	1.8	0.025	1.1	No	Fixed	No	Yes	Manual Reset
TPS3824-25†	2.50	2.25	2	0.025	1.1	No	Fixed	Yes	Yes	Manual Reset
TLC7725†	2.50	2.25	3	0.016	1	No	Programmable	Yes	No	Manual Reset
TPS3823-30†	3.00	2.63	1.5	0.025	1.1	No	Fixed	No	Yes	Manual Reset
TPS3824-30†	3.00	2.63	2	0.025	1.1	No	Fixed	Yes	Yes	Manual Reset
TLC7703	3.00	2.63	2.7	0.016	1	No	Programmable	Yes	No	Manual Reset
TPS3823-33†	3.30	2.93	1.7	0.025	1.1	No	Fixed	Yes	Yes	Manual Reset
TPS3824-33†	3.30	2.93	2	0.025	1.1	No	Fixed	Yes	Yes	Manual Reset
TLC7733	3.30	2.93	2.4	0.016	1	No	Programmable	Yes	No	Manual Reset
TPS3823-50†	5.00	4.55	1.3	0.025	1.1	No	Fixed	No	Yes	Manual Reset
TLC7705	5.00	4.55	1.5	0.016	1	No	Programmable	Yes	No	Manual Reset
TPS3824-50†	5.00	4.55	2	0.025	1.1	No	Fixed	Yes	Yes	Manual Reset
TLC7701	adj	1.1	5.4	0.016	1	No	Programmable	Yes	No	Manual Reset

† Devices released since 1987 Designer's Guide

Standard Microprocessor Supervisory Circuits (SVS)

Device	Minibit OT FMS	V _{CC} (V) typ	V _I (V) typ	V _I Tol (%) max	I _{CC} (mA) max	V _{IN} (V) min	SVS	Time Delay	Complementary Outputs	WDI	Description
TPS3823-25†	1.00	2.5	2.25	1.8	0.025	1.1	No	Fixed	No	Yes	Manual Reset
TPS3824-25†	1.00	2.5	2.25	2	0.025	1.1	No	Fixed	Yes	Yes	Manual Reset
TLC7725†	1.00	2.5	2.25	3	0.016	1	No	Programmable	Yes	No	Manual Reset
TPS3823-30†	1.00	3	2.63	1.5	0.025	1.1	No	Fixed	No	Yes	Manual Reset
TPS3824-30†	1.00	3	2.63	2	0.025	1.1	No	Fixed	Yes	Yes	Manual Reset
TLC7703	1.00	3	2.63	2.7	0.016	1	No	Programmable	Yes	No	Manual Reset
TPS3823-33†	1.00	3.3	2.93	1.7	0.025	1.1	No	Fixed	No	Yes	Manual Reset
TPS3824-33†	1.00	3.3	2.93	2	0.025	1.1	No	Fixed	Yes	Yes	Manual Reset
TLC7733	1.00	3.3	2.93	2.4	0.016	1	No	Programmable	Yes	No	Manual Reset
TL7770-5	2.00	5	4.55	1	5	1	Yes	Programmable	Yes	No	Manual Reset
TPS3823-50†	1.00	5	4.55	1.3	0.025	1.1	No	Fixed	No	Yes	Manual Reset
TLC7705	1.00	5	4.55	1.5	0.016	1	No	Programmable	Yes	No	Manual Reset

† Devices released since 1987 Designer's Guide

Standard Microprocessor Supervisory Circuits (SVS) (Continued)

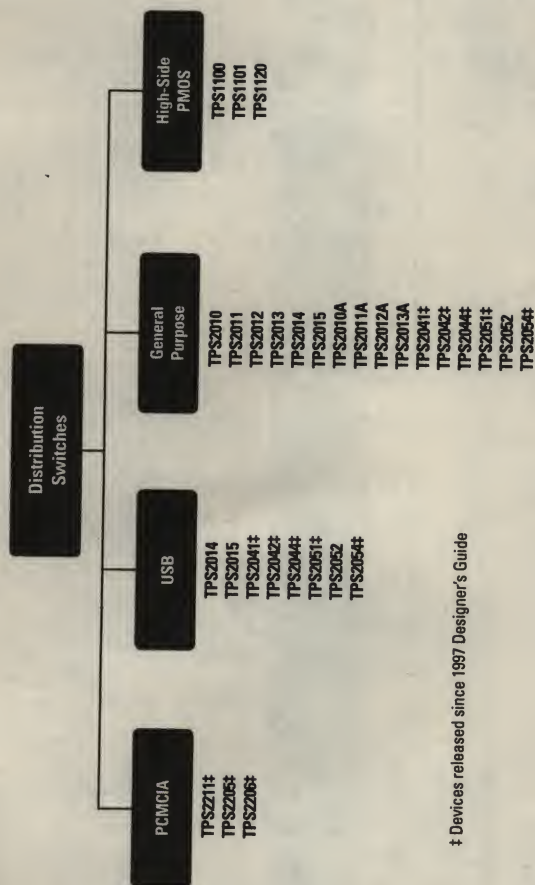
Device	Number Pins	V_{CC} (V) Life	V_I (V) Typ	I_{Tot} (mA) max	I_{CC} (mA) max	V_{CE} (V) min	QPS	Time Delay	Complementary Outputs	WDT	Description
TL7705A	1.00	5	4.55	2	3	3.6	No	Programmable	Yes	No	3-Terminal
TL7705B	1.00	5	4.55	2	3	1	No	Programmable	Yes	No	4-Terminal
TPS3824-50†	1.00	5	4.55	2	0.025	1.1	No	Fixed	Yes	Yes	3-Terminal
TL7757	1.00	5	4.55	3	2.5	1	No	No Delay	No	No	4-Terminal
TL7759	1.00	5	4.55	3	2	1	No	No Delay	Yes	No	3-Terminal
TL7709A	1.00	9	7.6	2	3	3.6	No	Programmable	Yes	No	3-Terminal
TL7712A	1.00	12	10.8	2	3	3.6	No	Programmable	Yes	No	3-Terminal
TL7770-15	2.00	15	13.64	1	5	1	Yes	Programmable	Yes	No	3-Terminal
TL7715A	1.00	15	13.5	2	3	3.6	No	Programmable	Yes	No	3-Terminal
TL7701	1.00	adj	1.1	5.4	0.016	1	No	Programmable	Yes	No	3-Terminal
TL7702A	1.00	pgm	pgm	2	3	3.6	No	Programmable	Yes	No	3-Terminal
TL7702B	1.00	pgm	pgm	2	3	1	No	Programmable	Yes	No	3-Terminal

† Devices released since 1987 Designer's Guide

Watch Dog Input Microprocessor Supervisory Circuits (SVS)

Device	V_{CC} (V) Typ	V_I (V) Typ	I_{Tot} (mA) max	I_{CC} (mA) max	V_{CE} (V) min	QPS	Time Delay	Complementary Outputs	WDT	Description
TPS3823-25†	2.50	2.25	1.8	0.025	1.1	No	Fixed	No	Yes	Manual Reset
TPS3824-25†	2.50	2.25	2	0.025	1.1	No	Fixed	Yes	Yes	Manual Reset
TPS3823-30†	3.00	2.63	1.5	0.025	1.1	No	Fixed	No	Yes	Manual Reset
TPS3824-30†	3.00	2.63	2	0.025	1.1	No	Fixed	Yes	Yes	Manual Reset
TPS3823-33†	3.30	2.93	1.7	0.025	1.1	No	Fixed	No	Yes	Manual Reset
TPS3824-33†	3.30	2.93	2	0.025	1.1	No	Fixed	Yes	Yes	Manual Reset
TPS3823-50†	5.00	4.55	1.3	0.025	1.1	No	Fixed	No	Yes	Manual Reset
TPS3824-50†	5.00	4.55	2	0.025	1.1	No	Fixed	Yes	Yes	Manual Reset

† Devices released since 1987 Designer's Guide



† Devices released since 1997 Designer's Guide

PCMCIA Distribution Switches

Device	Interface	3 V I_{sciss} (mA)	5 V I_{sciss} (mA)	Independent $V_{\text{DD}}/V_{\text{DD}}$ Switching	Over Current & Temp Protection	V_{PE} Good Reporting	Over Current Reporting	Description
TPS2211†	4 Line Parallel	90	90	No	Yes	No	Yes	Single PC Card Power-I/F Switch for Parallel PCMCIA Controller
TPS2205†	8 Line Parallel	110	140	No	Yes	No	Yes	2-Slot PC Card PWR-I/F Switch for Parallel PCMCIA Controller
TPS2206†	3 Line Serial w/Reset	110	140	No	Yes	No	Yes	2-Slot PC Card PWR-I/F Switch for Serial PCMCIA Controller

† Devices released since 1997 Designer's Guide

USB Distribution Switches

Device	Number of FETs	I_{sciss} (mA)	Output Current (A)	Current Limit (A)	V_{IN} Range (V)	Supply Current (μ A)	Over Current Reporting	Over Temp Reporting	Enable	Description
TPS2014	1	95	0.6	1.2	4.0 to 5.5	73	Yes	No	Neg	USB, GP Power Distribution Switch
TPS2015	1	95	1.0	2.0	4.0 to 5.5	73	Yes	No	Neg	USB, GP Power Distribution Switch
TPS2041†	1	90	0.5	0.9	2.7 to 5.5	80	Yes	Yes	Neg	USB, GP Power Distribution Switch
TPS2042†	2	90	0.5 ea	0.9 ea	2.7 to 5.5	80	Each	Yes	Neg	Dual USB, GP Power Distribution Switch
TPS2044†	4	90	0.5 ea	0.9 ea	2.7 to 5.5	160	Each	Yes	Neg	Quad USB, GP Power Distribution Switch
TPS2051†	1	90	0.5	0.9	2.7 to 5.5	80	Yes	Yes	Pos	USB, GP Power Distribution Switch
TPS2052	2	90	0.5 ea	0.9 ea	2.7 to 5.5	80	Each	Yes	Pos	Dual USB, GP Power Distribution Switch
TPS2054†	4	90	0.5 ea	0.9 ea	2.7 to 5.5	160	Each	Yes	Pos	Quad USB, GP Power Distribution Switch

† Devices released since 1997 Designer's Guide

General Purpose Distribution Switches

Device	Number of FETs	Turn-on Time (ns)	Output Current (mA)	Excess Load (W)	V _{DS} Range (V)	Supply Current (mA)	Over-Current Protection	Over-Temp Protection	Equable	Description
TPS2010	1	95	0.2	0.4	2.7 to 5.5	73	No	No	Neg	GP Power Distribution Switch
TPS2011	1	95	0.6	1.2	2.7 to 5.5	73	No	No	Neg	GP Power Distribution Switch
TPS2012	1	95	1.0	2.0	2.7 to 5.5	73	No	No	Neg	GP Power Distribution Switch
TPS2013	1	95	1.5	2.6	2.7 to 5.5	73	No	No	Neg	GP Power Distribution Switch
TPS2014	1	95	0.6	1.2	4.0 to 5.5	73	Yes	No	Neg	USB, GP Power Distribution Switch
TPS2015	1	95	1.0	2.0	4.0 to 5.5	73	Yes	No	Neg	USB, GP Power Distribution Switch
TPS2041†	1	90	0.5	0.9	2.7 to 5.5	80	Yes	Yes	Neg	USB, GP Power Distribution Switch
TPS2042†	2	90	0.5 ea	0.9 ea	2.7 to 5.5	80	Each	Yes	Neg	Dual USB, GP Power Distribution Switch
TPS2044†	4	90	0.5 ea	0.9 ea	2.7 to 5.5	160	Each	Yes	Neg	Quad USB, GP Power Distribution Switch
TPS2051†	1	90	0.5	0.9	2.7 to 5.5	80	Yes	Yes	Pos	USB, GP Power Distribution Switch
TPS2052	2	90	0.5 ea	0.9 ea	2.7 to 5.5	80	Each	Yes	Pos	Dual USB, GP Power Distribution Switch
TPS2054†	4	90	0.5 ea	0.9 ea	2.7 to 5.5	160	Each	Yes	Pos	Quad USB, GP Power Distribution Switch

† Devices released since 1997 Designer's Guide

High-Side PMOS Distribution Switches

Device	Number of FETs	Transistor (V _{DS}) (V)	V _{GS} (V)	I _D (A)	ESD Clamping	Description
TPS1100	1	400	15	1.6	Yes	Single P-channel Enhancement-Mode MOSFET
TPS1101	1	190	15	2.3	Yes	Single P-channel Enhancement-Mode MOSFET
TPS1120	2	400	15	1.17	Yes	Dual P-channel Enhancement-Mode MOSFET

V_{GS} = 4.5 V

MOSFET Drivers

MOSFET
Drivers

TPS2811
TPS2812
TPS2813
TPS2814
TPS2815
TPS2816†
TPS2817†
TPS2818†
TPS2819†
TPS2826†
TPS2829†

† Devices released since 1997 Designer's Guide

Device	Number of Drivers	Output Current (A) max	Rise/Fall Times (ns) max	Supply Current (μA) typ	V _{in} Range (V) typ	Internal Regulator	Active Input Pull-Up	Description
TPS2816†	1	2	25	150	4 to 14	Yes (8 to 40 V)	Yes	Single: Inverting
TPS2817†	1	2	25	150	4 to 14	Yes (8 to 40 V)	No	Single: Noninverting
TPS2818†	1	2	25	25	4 to 14	Yes (8 to 40 V)	No	Single: Inverting
TPS2819†	1	2	25	25	4 to 14	Yes (8 to 40 V)	No	Single: Noninverting
TPS2828†	1	2	25	25	4 to 14	No	No	Single: Inverting
TPS2829†	1	2	25	25	4 to 14	No	No	Single: Noninverting
TPS2811	2	2	20	5	4 to 14	Yes (8 to 40 V)	No	Dual: Inverting
TPS2812	2	2	20	5	4 to 14	Yes (8 to 40 V)	No	Dual: Noninverting
TPS2813	2	2	20	5	4 to 14	Yes (8 to 40 V)	No	Dual: 1 Noninverting, 1 Inverting
TPS2814	2	2	20	5	4 to 14	No	No	Dual: AND w/1 Noninverting, 1 Inverting
TPS2815	2	2	20	5	4 to 14	No	Yes	Dual: 2 Input NAND
TPS2830	2	2	50	10	4.5 to 13	Yes (32 max)	No	High- and Low-Side Drivers
TPS2831	2	2	50	10	4.5 to 13	Yes (32 max)	No	High- and Low-Side Driver, Inverted
TPS2832	2	2	50	10	4.5 to 13	Yes (32 max)	No	High and Low Drive without Crowbar
TPS2833	2	2	50	10	4.5 to 13	Yes (32 max)	No	High and Low Drive without Crowbar, Inverted

† Devices released since 1997 Designer's Guide

For technical assistance, requesting datasheets or samples, see Contact Information in Appendix A.

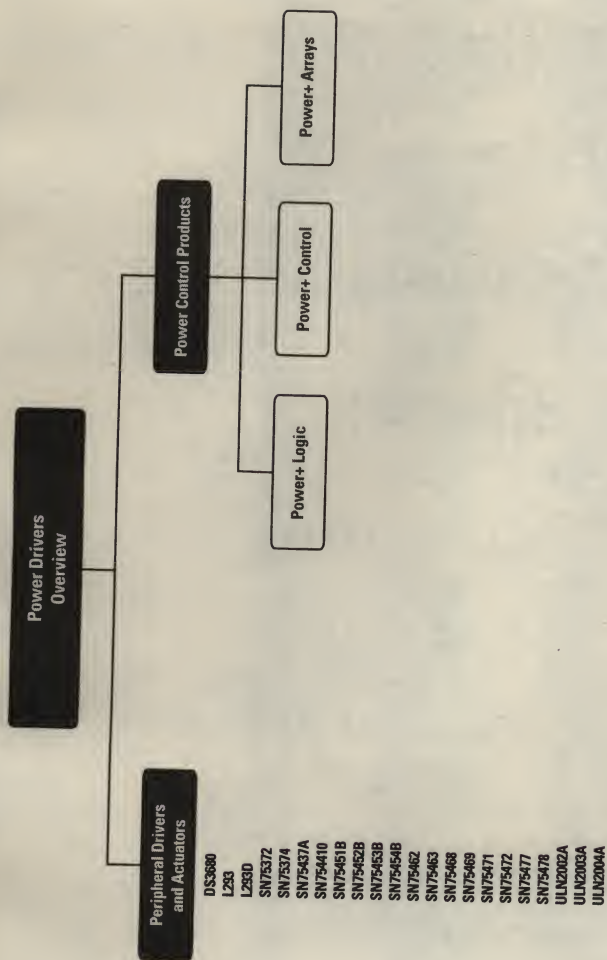
Two other resources for product information are:

- 1) the InfoNavigator CD-ROM (literature # SLYC005B)
- 2) the Semiconductor products category at the TI web site www.ti.com

Introduction

Texas Instruments offers an extensive line of the industry standard integrated circuits designed to provide highly reliable circuits for switching inductive loads such as lamps, solenoids, motors, valves, and relays.

TI power devices represent technologies from the classic bipolar process to the Texas Instruments PRISM process, which offer improvements in power consumption and temperature stability.



Peripheral Drivers and Actuators

Device	V _{CC} (V)	Switching Voltage (V)	Peak Output Current (mA)	Drivers Per Package	Output Stamps Outputs	Logic	Input Compatibility	Delay Time (ns)	Uses/Notes
SN75372	24	24	500	2	Yes	NAND	TTL	20	MOSFET Driver
SN75374	24	24	500	4	Yes	NAND	TTL	20	MOSFET Driver
SN75451B	30	20	500	2	No	AND	TTL	18	Peripheral Driver
SN75452B	30	20	500	2	No	NAND	TTL	26	Peripheral Driver
SN75453B	30	20	500	2	No	OR	TTL	18	Peripheral Driver
SN75454B	30	20	500	2	No	NOR	TTL	27	Peripheral Driver
SN75462	35	30	500	2	No	NAND	TTL	45	Peripheral Driver
SN75463	35	30	500	2	No	OR	TTL	30	Peripheral Driver
L293D	36	36	1200	4	Yes	Quad Half-H	TTL	800	Half-H Driver
L293	36	36	2000	4	No	Quad Half-H	TTL	800	Half-H Driver
SN754410	36	36	2000	4	Yes	Quad Half-H	CMOS,TTL	800	Half-H Driver
ULN2002A	50	50	500	7	Yes	Invert	CMOS	250	Darlington Transistor Array
ULN2003A	50	50	500	7	Yes	Invert	CMOS,TTL	250	Darlington Transistor Array
ULN2004A	50	50	500	7	Yes	Invert	CMOS	250	Darlington Transistor Array
DS3880	60	60	100	4	Yes	Telecom Relay Driver	CMOS,TTL	1000	Telephone Relay Driver
SN75471	70	55	500	2	No	AND	TTL	30	Peripheral Driver
SN75472	70	55	500	2	No	NAND	TTL	45	Peripheral Driver
SN75437A	70	35	750	4	Yes	Invert	CMOS,TTL	1950	Peripheral Driver
SN75477	100	55	500	2	Yes	NAND	CMOS,TTL	200	Peripheral Driver
SN75478	100	55	500	2	Yes	OR	CMOS,TTL	200	Peripheral Driver
SN75468	100	50	500	7	Yes	Invert	CMOS,TTL	250	Darlington Transistor Array
SN75469	100	50	500	7	Yes	Invert	CMOS	250	Darlington Transistor Array

Power+ Logic

8-Bit
Addressable
Latches

TPIC6259
TPIC6A259¹
TPIC6B259²

Octal D-Type
Latches

TPIC6273
TPIC6B273²

8-Bit
Shift Registers

TPIC6595
TPIC6A595¹
TPIC6B595²
TPIC6C595²

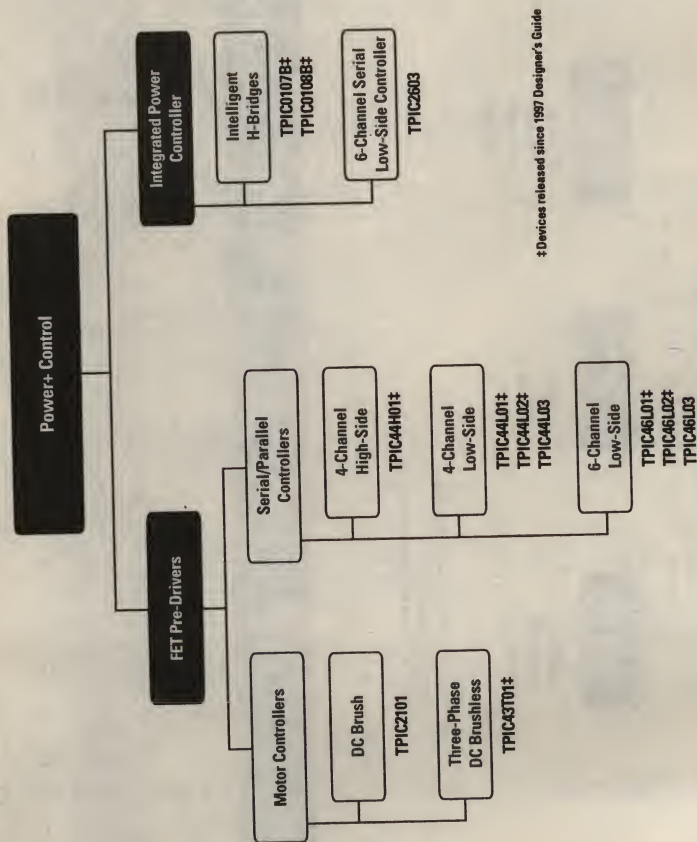
¹ Short-circuit and current-limit protection² Current-limit capability³ Devices released since 1987 Designer's Guide

Device	V _{CC} (V) max	I _{CC} (mA) typ	I _{OL} (mA) typ	I _{OH} (mA) typ	V _{OL} (V) max	V _{OH} (V) min	t _{PLH} (ns)	t _{PLL} (ns)	t _{PHL} (ns)	t _{PL} (ns)	t _{PH} (ns)	t _{tr} (ns)	t _{su} (ns)	t _{fd} (ns)	t _{rec} (ns)	Description	
TPIC6C595 ²	33	20	0.1	0.25	0.1	0.25	7	30	80	80	80	80	80	80	80	80	8-Bit Shift Register
TPIC6259	45	15	0.25	0.75	0.25	0.75	1.3	75	625	625	625	625	625	625	625	625	8-Bit Addressable Latch
TPIC6273	45	15	0.25	0.75	0.25	0.75	1.3	75	625	625	625	625	625	625	625	625	Octal D-Type Latch
TPIC6595	45	15	0.25	0.75	0.25	0.75	1.3	75	650	650	650	650	650	650	650	650	8-Bit Shift Register
TPIC6B259 ³	50	20	0.15	0.5	0.15	0.5	5	30	150	150	150	150	150	150	150	150	8-Bit Addressable Latch
TPIC6B273 ²	50	20	0.15	0.5	0.15	0.5	5	30	150	150	150	150	150	150	150	150	Octal D-Type Latch
TPIC6B595 ²	50	20	0.15	0.5	0.15	0.5	5	30	150	150	150	150	150	150	150	150	8-Bit Shift Register
TPIC6A259 ¹	50	500	0.35	1.1	0.35	1.1	1	75	125	125	125	125	125	125	125	125	8-Bit Addressable Latch
TPIC6A595 ¹	50	500	0.35	1.1	0.35	1.1	1	75	125	125	125	125	125	125	125	125	8-Bit Shift Register

¹ Short-circuit and current-limit protection

¹ Short-circuit and current-limit protection² Current-limit capability³ Devices released since 1987 Designer's Guide

Power+ Control



‡Devices released since 1997 Designer's Guide

Power+ Control—DC Brush Motor Controller

Device	V_{in} (V) range	I_{out} (mA) typ	I_{out} (mA) typ	I_{out} (mA) typ	V_{out} (V) typ	Fault Protection	Description
TPIC2101	8 to 16	4	20	50	10/8	Yes	DC Brush Motor Controller

Power+ Control—Three-Phase DC Brushless Motor Controller

Device	V_{in} (V) range	I_{out} (mA) typ	I_{out} (mA) typ	I_{out} (mA) typ	V_{out} (V) typ	Fault Protection	Description
TPIC43T01†	18 to 28	27	±4 to ±12	±10	Yes	Yes	Three-Phase Brushless Motor RPM Controller

† Devices released since 1997 Designer's Guide

Power+ Control—Serial/Parallel Controllers

Device	V_{in} (V) range	I_{out} (mA) typ	V_{out} (V) range	I_{out} (mA) typ	I_{out} (mA) typ	V_{out} (V) typ	Fault Protection	Description
TPIC44L01†	8 to 24	0.5	7 to 13.5	10	Yes	Yes	Yes	4-Channel Serial/Parallel Low-Side FET Pre-Driver
TPIC44L02†	8 to 24	0.5	7 to 13.5	10	Yes	Yes	Yes	4-Channel Serial/Parallel Low-Side FET Pre-Driver
TPIC44L03	8 to 24	0.5	7 to 13.5	10	Yes	Yes	Yes	4-Channel Serial/Parallel Low-Side FET Pre-Driver
TPIC46L01†	8 to 24	0.5	7 to 13.5	10	Yes	Yes	Yes	6-Channel Serial/Parallel Low-Side FET Pre-Driver
TPIC46L02†	8 to 24	0.5	7 to 13.5	10	Yes	Yes	Yes	6-Channel Serial/Parallel Low-Side FET Pre-Driver
TPIC46L03	8 to 24	0.5	7 to 13.5	10	Yes	Yes	Yes	6-Channel Serial/Parallel Low-Side FET Pre-Driver
TPIC44H01†	8 to 24	4	$V_{in} \pm 4$ to $V_{in} + 18$	5	Yes	Yes	Yes	4-Channel Serial/Parallel High-Side FET Pre-Driver

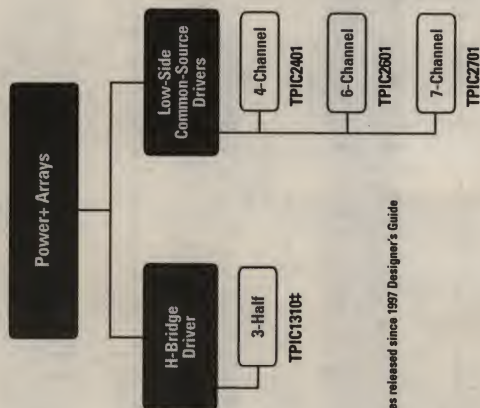
† Devices released since 1997 Designer's Guide

Power+ Control—Integrated Power Controllers

Device	V_{in} (V) range	V_{out} (V) typ	I_{out} (mA) typ	I_{out} (mA) typ	I_{out} (mA) typ	Fault Protection	Description
TPIC2603	5.5 to 25	68	0.35/2.25	0.7	4000	Yes	6-Channel Serial Interface Low-Side Controller
TPIC0107B†	6 to 18	40	3/5	0.28	2	Yes	PWM Control Intelligent H-Bridge
TPIC0108B†	6 to 18	40	3/5	0.28	2	Yes	PWM Control Intelligent H-Bridge

† Devices released since 1997 Designer's Guide

Power+ Arrays



† Devices released since 1997 Designer's Guide

Device	V _{DS} (V) max	V _{GS} (V) typ	I _{CONT} (A)	I _{PEAK} (A)	r _{DS(on)} (Ω) typ	E _{AS} (mJ) max	t _r (ns) typ	Q _g (nC) typ	ESD (kV) max	Description
TPI1310†	30	1.2	3	12	0.25		30/70 ²	1.6	2	3-Half H-Bridge Driver
TPI12401	60	10	1.5	6	0.3	36	80	4	2	4-Channel Common-Source Driver
TPI12601	60	10	2	10	0.25	105	72	5.1	2	6-Channel Common-Source Driver
TPI12701	60	15	0.5	3	0.5	22	165	2.8		7-Channel Common-Source Driver

† High-side

† Low-side

† Devices released since 1997 Designer's Guide

Special Functions

(Microcontrollers, Clock Drivers, Timers, Phase-Locked Loop)

Contents

Introduction & New Product Previews	6-2
Product Selection Guides	
MSP430 Ultra-Low-Power Microcontrollers	6-3
Clock Drivers/Synthesizers	6-5
Timers	6-8
Phase-Locked Loop	6-8

For technical assistance, requesting datasheets or samples, see Contact Information in Appendix A.

Two other resources for product information are:

- 1) the InfoNavigator CD-ROM (literature # SLYC005B)
- 2) the Semiconductor products category at the TI web site www.ti.com

Special Functions are those devices which don't naturally fall into one of the other categories defined in this document. Some of these devices appeared in other sections, where they are also appropriate.

Special Functions New Product Previews

The following new devices are expected to be released in the near future. For more information, please refer to the InfoNavigator CD-ROM, literature number SLYC005B.

Device Description

MSP430 Ultra-Low-Power Microcontrollers

- MSP430x31y Ultra-Low-Power, 16-Bit RISC Microcontroller w/LCD Driver, Multiple Timers
- MSP430x32y Ultra-Low-Power, 16-Bit RISC Microcontroller w/LCD Driver, Multiple Timers, and 14-Bit A/D
- MSP430x33y Ultra-Low-Power, 16-Bit RISC Microcontroller w/LCD Driver, Multiple Timers, Hardware MAC, Timer_A, and USART
- MSP430x11y Ultra-Low-Power, 16-Bit RISC Microcontroller (No LCD Driver), Timer_A, 14 I/O

x = "P" to designate an OTP device or "C" to designate a ROM-coded device
y = identifies the size of memory ("1,2,3...7")

Clock Drivers

- CDC924 PC MB Clk Synthesizer/Driver 133 MHz max. Frequency w/Spread Spectrum
- CDCR81 400-MHz Direct Rambus™ Clock Generator
- CDC2509C 1:9 PLL Clock Driver w/3-State Output with Spread Spectrum Clock Tracking
- CDC2510C 1:10 PLL Clock Driver w/3-State Output with Spread Spectrum Clock Tracking
- CDC857 1:10 SSTL-II Differential Clock Driver Featuring a PLL Disable Mode

Web Locations for Specific Product Groups

- MSP430 Ultra-Low-Power Microcontrollers www.ti.com/sc/docs/msp/msp430/msp430.htm
- Clock Drivers/Synthesizers www.ti.com.sc/docs/msp/cdc/cdc.htm

MSP430 Ultra-Low-Power Microcontrollers

Device	ROM	OTP/EPROM	RAM	A/D	LCD Seg.	JTAG	I/O	Peripherals	Active Mode Power (3 V)	V _{DD}	Description
MSP430C111	2 KB		128B	Slope	N/A	Yes	14	WDT, T_A	330 µA	2.5 to 5.5	16-Bit Ultra-Low-Power µC w/out LCD Driver, ROM-Code
MSP430C112	4 KB		256B	Slope	N/A	Yes	14	WDT, T_A	330 µA	2.5 to 5.5	16-Bit Ultra-Low-Power µC w/out LCD Driver, ROM-Code
MSP430P112		4 KB	256B	Slope	N/A	Yes	14	WDT, T_A	400 µA	2.7 to 5.5	16-Bit Ultra-Low-Power µC w/out LCD Driver, One-Time-Prog
PMS430E112		4 KB	256B	Slope	N/A	Yes	14	WDT, T_A		2.7 to 5.5	16-Bit Ultra-Low-Power µC w/out LCD Driver, EPROM
MSP430C311S	2 KB		128B	Slope	64 Seg	Yes	8	WDT, BT, T/P, 8bT/C	400 µA	2.5 to 5.5	16-Bit Ultra-Low-Power µC with LCD Driver, ROM-Code
MSP430C312†	4 KB		256B	Slope	92 Seg	Yes	8	WDT, BT, T/P, 8bT/C	400 µA	2.5 to 5.5	16-Bit Ultra-Low-Power µC with LCD Driver, ROM-Code
MSP430C313†	8 KB		256B	Slope	92 Seg	Yes	8	WDT, BT, T/P, 8bT/C	400 µA	2.5 to 5.5	16-Bit Ultra-Low-Power µC with LCD Driver, ROM-Code
MSP430C314†	12 KB		512B	Slope	92 Seg	Yes	8	WDT, BT, T/P, 8bT/C	400 µA	2.5 to 5.5	16-Bit Ultra-Low-Power µC with LCD Driver, ROM-Code
MSP430C315†	16 KB		512B	Slope	92 Seg	Yes	8	WDT, BT, T/P, 8bT/C	400 µA	2.5 to 5.5	16-Bit Ultra-Low-Power µC with LCD Driver, ROM-Code
MSP430P313†		8 KB	256B	Slope	92 Seg	Yes	8	WDT, BT, T/P, 8bT/C	2.1 mA	2.7 to 5.5	16-Bit Ultra-Low-Power µC with LCD Driver, One-Time-Prog
MSP430P315†		16 KB	512B	Slope	92 Seg	Yes	8	WDT, BT, T/P, 8bT/C	490 µA	2.7 to 5.5	16-Bit Ultra-Low-Power µC with LCD Driver, One-Time-Prog
MSP430P315S		16 KB	512B	Slope	64 Seg	Yes	8	WDT, BT, T/P, 8bT/C	490 µA	2.7 to 5.5	16-Bit Ultra-Low-Power µC with LCD Driver, One-Time-Prog
PMS430E313		8 KB	256B	Slope	92 Seg	Yes	8	WDT, BT, T/P, 8bT/C		2.7 to 5.5	16-Bit Ultra-Low-Power µC with LCD Driver, EPROM
PMS430E315		16 KB	512B	Slope	92 Seg	Yes	8	WDT, BT, T/P, 8bT/C		2.7 to 5.5	16-Bit Ultra-Low-Power µC with LCD Driver, EPROM

* All unused LCD segments can be used as outputs.

† Devices released since 1997 Designer's Guide

Peripherals Abbreviations:

T_A = Temperature Sensor
 BT = Background Timer (16-bit)
 BT = Basic Timer (8-bit or two 8-bit)
 T/P = Timer Port (counter: one 16-bit or 8-bit)
 T/C = Internal Timer (8-bit) (serial comm, pulse counting/accum)
 T_A = Timer (16-bit with capture/compare)

ADC = 14-bit A/D converter
 "31x x" = All peripherals found on 31x family plus
 MPY = Hardware Multiplier
 USART = UART/SP

MSP430 Ultra-Low-Power Microcontrollers (Continued)

Device	ROM	OTP/ EPROM	RAM	JTAG	ADC	Seq.	IO	Peripherals	Active Mode Power (µA)	V _{CC}	Description
MSP430C323†	8 KB		256B	14-Bit	84 Seg	Yes	8	WDT, BT, T/P, 8bT/C, ADC	400 µA	2.5 to 5.5	16-Bit Ultra-Low-Power µC with LCD Driver & 14-Bit A/D, ROM-Code
MSP430C325†	16 KB		512B	14-Bit	84 Seg	Yes	8	WDT, BT, T/P, 8bT/C, ADC	400 µA	2.5 to 5.5	16-Bit Ultra-Low-Power µC with LCD Driver & 14-Bit A/D, ROM-Code
MSP430P325†		16 KB	512B	14-Bit	84 Seg	Yes	8	WDT, BT, T/P, 8bT/C, ADC	3 mA	2.7 to 5.5	16-Bit Ultra-Low-Power µC with LCD Driver & 14-Bit A/D, One-Time-Prog
PMS430E325		16 KB	512B	14-Bit	84 Seg	Yes	8	WDT, BT, T/P, 8bT/C, ADC		2.7 to 5.5	16-Bit Ultra-Low-Power µC with LCD Driver & 14-Bit A/D, EPROM
MSP430C336†	24 KB		1 KB	Slope	120 Seg	Yes	40	31x+, T_A, MPY, USART	400 µA	2.5 to 5.5	16-Bit Ultra-Low-Power µC with LCD Driver, H/W Multiplier & USART, ROM-Code
MSP430C337†	32 KB		1 KB	Slope	120 Seg	Yes	40	31x+, T_A, MPY, USART	400 µA	2.5 to 5.5	16-Bit Ultra-Low-Power µC with LCD Driver, H/W Multiplier & USART, ROM-Code
MSP430F337‡		32 KB	1 KB	Slope	120 Seg	Yes	40	31x+, T_A, MPY, USART	3 mA	2.7 to 5.5	16-Bit Ultra-Low-Power µC with LCD Driver, H/W Multiplier & USART, One-Time-Prog
PMS430E337		32 KB	1 KB	Slope	120 Seg	Yes	40	31x+, T_A, MPY, USART		2.7 to 5.5	16-Bit Ultra-Low-Power µC with LCD Driver, H/W Multiplier & USART, EPROM

* All unused LCD segments can be used as outputs.

† Devices released since 1987 Designer's Guide

Peripherals Abbreviations:

WDT = Watchdog Timer (16-bit)

BT = Basic Timer (timer: one 16-bit or two 8-bit)

T/P = Timer Port (counter: one 8-bit or two 8-bit)

T/C = Interval Timer (8-bit) (serial comm. pulse counting/accum)

T_A = Timer (16-bit with capture/compare)

ADC = 14-bit AD converter

31x+ = All peripherals found on 31x family, plus

MPY = Hardware Multiplier

USART = UART/SP

Device	Input Level	No. of Outputs	Output Drive (mA)	Output Level	Static Current (mA)	t _{skel} (ns)	t _{skp} (ns)	t _{del} (ns)	V _{cc} Range (V)	Description
3.3-V V_{cc}										
CDC111	LVPECL	9		LVPECL	80	0.05			3 to 3.6	3.3-V Driver
CDC203	LV TTL	6	-12/12	LV TTL	0.04	0.7			3 to 3.6	3.3-V Driver
CDC2351	LV TTL	10	-12/12	LV TTL	7.85	0.5	0.8		3 to 3.6	3.3-V Driver
CDC2509†	LV TTL	9		LV TTL		0.2			3 to 3.6	3.3-V Phase-Lock Loop Clock Driver with 3-State Outputs
CDC2509A†	LV TTL	9	-12.0/12	LV TTL	10 µA	0.2			3 to 3.6	3.3-V Phase-Lock Loop Clock Driver
CDC2509B†	LV TTL	9	-12.0/12	LV TTL	10 µA	0.2		1.0	3 to 3.6	1-to-9 PLL Clock Driver
CDC2510†	LV TTL	10	-12.0/12	LV TTL	10 µA	0.2			3 to 3.6	3.3-V Phase-Lock Loop Clock Driver
CDC2510A†	LV TTL	10	-12.0/12	LV TTL	10 µA	0.2			3 to 3.6	3.3-V Phase-Lock Loop Clock Driver
CDC2510B†	LV TTL	10	-12.0/12	LV TTL	10 µA	0.2		1.0	3 to 3.6	3.3-V Phase-Lock Loop Clock Driver
CDC2516†	LV TTL	16	-12.0/12	LV TTL	10 µA	0.2			3 to 3.6	3.3-V Phase-Lock Loop Clock Driver with 3-State Outputs
CDC2536†	LV TTL	6	-12/12	LV TTL	2	0.5		1.0	3 to 3.6	3.3-V Driver
CDC2582	LVPECL	12	-12/12	LV TTL	5	0.5		1.0	3 to 3.6	3.3-V Driver
CDC2586	TTL	12	-32/32	LV TTL	1	0.5		1.0	3 to 3.6	3.3-V Driver
CDC318A†	LV TTL	18	-1/1	LV TTL	0.5	0.25	0.65		3 to 3.6	1-Line to 18-Line Clock Driver with µC Control Interface
CDC319†	LV TTL	10	-24/24	LV TTL	0.5	0.25	0.5		3 to 3.6	1-Line to 10-Line Clock Driver
CDC351	LV TTL	10	-32/32	LV TTL	12.65	0.5	0.8		3 to 3.6	3.3-V Driver
CDC509†	LV TTL	9	-24/24	LV TTL		0.2			3 to 3.6	3.3-V Driver
CDC516†	LV TTL	16	-24/24	LV TTL	0.2				3 to 3.6	3.3-V Driver
CDC536†	TTL	6	-32/32	LV TTL	2	0.5		1.0	3 to 3.6	3.3-V Driver
CDC582	LVPECL	12	-32/32	LV TTL	5	0.5		1.0	3 to 3.6	3.3-V Driver
CDC586	LV TTL	6	-32/32	LV TTL	1	0.5		1.0	3 to 3.6	3.3-V Driver
CDC9841									3.135 to 3.6	3.3-V Driver
CDC9842									3.135 to 3.6	3.3-V Driver
CDC9843									3.135 to 3.6	3.3-V Driver
5-V V_{cc}										
CDC208	TTL	8	-24/24	CMOS	0.08	1.0			4.5 to 5.5	Dual 1-to-4 Clock Drivers
CDC328A	TTL	6	-48/48	TTL	25	1.0	1.0		4.75 to 5.25	1-to-6 Clock Driver with Selectable Polarity
CDC329A	TTL	6	-32/32	CMOS	25	1.5			4.75 to 5.25	1-to-6 Clock Driver with Selectable Polarity
CDC337	TTL	8	-48/48	CMOS	77.5	0.9			4.75 to 5.25	1-to-8 (4 Same Frequency, 4 Divide-by-2) Clock Driver with Clear
CDC339	TTL	8	-48/48	TTL	77.5	0.9			4.75 to 5.25	1-to-8 (4 Same Frequency, 4 Divide-by-2) Clock Driver with Clear

† Devices released since 1997 Designer's Guide

SPECIAL FUNCTIONS

Clock Drivers/Synthesizers (Continued)

Device	Input Level	No. of Outputs	Output Drive (mA)	Output Level	Static Current (mA)	I_{OL} (mA)	I_{OH} (mA)	V_{CC} Range (V)	Discontinuous
5-V V_{CC} (Continued)									
CDC391	TTL	6	-48/48	TTL	25	1.0	1.0	4.75 to 5.25	1-to-6 Clock Driver with Selectable Polarity & 3-State Output
CDC340	TTL	8	-48/48	TTL	18.25	0.6	0.9	4.75 to 5.25	1-to-8 Clock Driver with Tight AC Specification
CDC341	TTL	8	-48/48	TTL	18.25	0.6	0.9	4.75 to 5.25	1-to-8 Clock Driver with Tight AC Specification
Buffer/Driver									
CDC111	LVPECL	9		LVPECL	80	0.05		3 to 3.6	3.3-V Driver
CDC203	LVTTTL	6	-12/12	LVTTTL	0.04	0.7		3 to 3.6	3.3-V Driver
CDC208	TTL	8	-24/24	CMOS	0.08	1.0		4.5 to 5.5	Dual 1-to-4 Clock Drivers
CDC2351	LVTTTL	10	-12/12	LVTTTL	7.85	0.5	0.8	3 to 3.6	3.3-V Driver
CDC2509†	LVTTTL	9		LVTTTL		0.2		3 to 3.6	3.3-V Phase-Lock Loop Clock Driver with 3-State Outputs
CDC2509A†	LVTTTL	9		LVTTTL		0.2		3 to 3.6	3.3-V Phase-Lock Loop Clock Driver with 3-State Outputs
CDC2509B†	TTL	9	-12.0	TTL	10 μ A	0.2	1	3 to 3.6	1-to-9 PLL Clock Driver
CDC2510†	LVTTTL	10		LVTTTL	0.2			3 to 3.6	3.3-V Phase-Lock Loop Clock Driver
CDC2510A†	LVTTTL	10		LVTTTL	0.2			3 to 3.6	3.3-V Phase-Lock Loop Clock Driver
CDC2510B†	TTL	10	-12.0	TTL	10 μ A	0.2	1	3 to 3.6	3.3-V Phase-Lock Loop Clock Driver
CDC2516†	LVTTTL	16		LVTTTL	0.2			3 to 3.6	3.3-V Phase-Lock Loop Clock Driver with 3-State Outputs
CDC2536†	LVTTTL	6	-12/12	LVTTTL	2	0.5	1.0	3 to 3.6	3.3-V Driver
CDC2582	LVPECL	12	-12/12	LVTTTL	5	0.5	1.0	3 to 3.6	3.3-V Driver
CDC2586	TTL	12	-32/32	LVTTTL	1	0.5	1.0	3 to 3.6	3.3-V Driver
CDC318A†	LVTTTL	18	-1/1	LVTTTL	0.5	0.25	0.65	3 to 3.6	1-Line to 18-Line Clock Driver with I ² C Control Interface
CDC319†	LVTTTL	10	-24/24	LVTTTL	0.5	0.25	0.5	3 to 3.6	1-Line to 10-Line Clock Driver
CDC328A	TTL	6	-48/48	TTL	25	1.0	1.0	4.75 to 5.25	1-to-6 Clock Driver with Selectable Polarity
CDC329A	TTL	6	-32/32	CMOS	25	1.5		4.75 to 5.25	1-to-6 Clock Driver with Selectable Polarity
CDC337	TTL	8	-48/48	CMOS	77.5	0.9		4.75 to 5.25	1-to-8 (4 Same Frequency, 4 Divide-by-2) Clock Driver with Clear
CDC339	TTL	8	-48/48	TTL	77.5	0.9		4.75 to 5.25	1-to-8 (4 Same Frequency, 4 Divide-by-2) Clock Driver with Clear
CDC340	TTL	8	-48/48	TTL	18.25	0.6	0.9	4.75 to 5.25	1-to-8 Clock Driver with Tight AC Specification
CDC341	TTL	8	-48/48	TTL	18.25	0.6	0.9	4.75 to 5.25	1-to-8 Clock Driver with Tight AC Specification

† Devices released since 1997 Designer's Guide

Clock Drivers/Synthesizers (Continued)

Device	Input Level	No. of Outputs	Output Drive (mA)	Output Level	Static Current (mA)	t_{PHL} (ns)	t_{PLH} (ns)	t_{PROP} (ns)	V_{CC} Range (V)	Description
Buffer/Driver (Continued)										
CDC351	LVTTTL	10	-32/32	LVTTTL	12.65	0.5	0.8		3 to 3.6	3.3-V Driver
CDC509†	LVTTTL	9	-24/24	LVTTTL		0.2			3 to 3.6	3.3-V Driver
CDC516†	LVTTTL	16	-24/24	LVTTTL		0.2			3 to 3.6	3.3-V Driver
CDC536†	TTL	6	-32/32	LVTTTL	2	0.5		1.0	3 to 3.6	3.3-V Driver
CDC582	LVPECL	12	-32/32	LVTTTL	5	0.5		1.0	3 to 3.6	3.3-V Driver
CDC586	LVTTTL	6	-32/32	LVTTTL	1	0.5		1.0	3 to 3.6	3.3-V Driver
Buffer/Driver with PLL										
CDC2508†	LVTTTL	9		LVTTTL		0.2			3 to 3.6	3.3-V Phase-Lock Loop Clock Driver with 3-State Outputs
CDC2509A†	LVTTTL	9		LVTTTL		0.2			3 to 3.6	3.3-V Phase-Lock Loop Clock Driver with 3-State Outputs
CDC2508†	TTL	9	-12/0	TTL	10	0.2		1	3 to 3.6	1-to-9 PLL Clock Driver
CDC2510†	LVTTTL	10		LVTTTL		0.2			3 to 3.6	3.3-V Phase-Lock Loop Clock Driver
CDC2510A†	LVTTTL	10		LVTTTL		0.2			3 to 3.6	3.3-V Phase-Lock Loop Clock Driver
CDC2510B†	TTL	10	-12/0	TTL	10	0.2		1	3 to 3.6	3.3-V Phase-Lock Loop Clock Driver
CDC2516†	LVTTTL	16		LVTTTL		0.2			3 to 3.6	3.3-V Phase-Lock Loop Clock Driver with 3-State Outputs
CDC2536†	LVTTTL	6	-12/12	LVTTTL	2	0.5		1.0	3 to 3.6	3.3-V Driver
CDC2582	LVPECL	12	-12/12	LVTTTL	5	0.5		1.0	3 to 3.6	3.3-V Driver
CDC2586	TTL	12	-32/32	LVTTTL	1	0.5		1.0	3 to 3.6	3.3-V Driver
CDC509†	LVTTTL	9	-24/24	LVTTTL		0.2			3 to 3.6	3.3-V Driver
CDC516†	LVTTTL	16	-24/24	LVTTTL		0.2			3 to 3.6	3.3-V Driver
CDC536†	TTL	6	-32/32	LVTTTL	2	0.5		1.0	3 to 3.6	3.3-V Driver
CDC582	LVPECL	12	-32/32	LVTTTL	5	0.5		1.0	3 to 3.6	3.3-V Driver
CDC586	LVTTTL	6	-32/32	LVTTTL	1	0.5		1.0	3 to 3.6	3.3-V Driver

† Devices released since 1987 Designer's Guide

Device	V_{CC} Range (V)	No.	Description
Synthesizer Drivers			
CDC9841	3.135 to 3.6		3.3-V Driver
CDC9842	3.135 to 3.6		3.3-V Driver
CDC9843	3.135 to 3.6		3.3-V Driver

SPECIAL
FUNCTIONS

Timers

Device	Description
TLC551	LinCMOSTM Timer
TLC552	Dual LinCMOS Timer
TLC555	Low Power Timer
TLC556	Dual LinCMOS Timer

Phase-Locked Loop

Device	Clock Input (kHz)	Lock Time (ms)	Frequency Error (ppm)	Output Current (mA)	Supply Voltage (V)
TLC2932	100	50	2	2	3.0/5.0
TLC2933	100	100	2	2	3.0/5.0
TLC2942	100	50	2	2	3.0/5.0

Resources & Contact Information

Contents

Resources

Data Books	A-2
Selection Guides	A-2
Application Notes	A-2
Data Manuals	A-3
Evaluation Kits	A-3

TI Worldwide Contact Information

Internet	A-5
Product Information Centers	A-5

For part number ordering information, see Appendix B.
Refer to Appendix C for a device index that includes
literature and package information by device.

Resources

To order any of the following literature or tools by phone, contact the nearest Product Information Center listed on page A-5. Additional information and email contact options for Mixed-Signal & Analog Products are available at the Tools & Design Assistance web site www.ti.com/sc/docs/msp/tools/tools.htm.

DATA BOOKS

Data Acquisition Circuits, 1995	SLAD001
Data Transmission Circuits, 1998	SLLD001B
Intelligent Opto Sensors, 1996	SOYDE02B
MSP430 Family Architecture Guide and Module Library	SLAU108
Operational Amplifiers and Comparators Vol. A, 1997	SLYD011A
Operational Amplifiers and Comparators Vol. B, 1997	SLYD012A
Power Supply Circuits, 1996	SLVD002
Linear Circuits Power+ and Peripheral Drivers/Attenuators, 1996	SLYD010A
Semiconductor Group Package Outlines Reference Guide, 1998	SSYU001D
Wireless & Telecommunications Products, 1996	SLWD001

SELECTION GUIDES

Excaltur Op Amp Selection Guide, May '97	SLVB001B
InfoNavigator CD-ROM, 1999	SLYC005B
MSP430 Ultra-Low-Power Microcontrollers Product Bulletin	SLAB034
Serial Port Products Bulletin, 1995	SLB084
Single-Supply CMOS Op Amp Selection Guide, May '97	SL0T128B
3 V Voltage Regulators Selection Guide, Mar '96	SLVB002

APPLICATION NOTES

(power supply products)	
Designing Switching Power Supplies with the TL494	SLVA001A
Designing with the TL5001 PWM Controller	SLVA034A
Designing Switch-Mode Power Supplies with the TL598 Application	SLVA003B
Examples of Applications with the Pulse Width Modulator TL5001	SLVA005
Supply Voltage Supervisor TL77XX Series	SLVA004
TL770X Series of BiCMOS Supply Voltage Supervisors	SLVA003
TPS202X3x and TPS204X5x USB Power Distribution	SLVA049
TPSS625 Working with TMS320C6201 Apps	SLVA047
Low Cost Power Solutions for TMS320C6201	SLVA046
Dual Power Supplies for the C549	SPRA280
TL2925 Virtual Ground Generator Product Brief	SL0V001
TL77xx Applications Series	SLVA002

Title	Order No.
APPLICATION NOTES (Continued) (data transmission products)	
Evaluating the Low-Voltage Differential Signaling (LVDS) EVM	SLAA033
Interface Circuits for SCSI	SLAA037
Interface Circuits for TIA/EIA-232-F	SLAA035
Interface Circuits for TIA/EIA-485	SLAA036
Interface Circuits for TIA/EIA-644	SLAA038
Low-Voltage Differential Signaling (LVDS) Design Notes	SLAA014
Reducing EMI with LVDS	SLAA030A
Slew-Rate Control of LVDS Circuits	SLAA034
SN75976A 9-Channel Differential Transceiver Thermal Analysis	SLAA029
Using an LVDS Receiver with 422 Data	SLAA031
(power control products)	
DC Brush Motor Control Using the TPI2C101	SLIT110
Automotive Solenoid and Lamp Control Using the TPI2C603	SLIT111
Automotive Anti-Lock Brake System Control Using the TPI2C44L0x and TPI2C46L0x	SLIT114A
Automotive Fuel Injector Control Using the TPI2C44L0x, TPI2C401, TPI2C46L0x and TPI2C601	SLIT112
Precision RPM Control of 3-phase Brushless DC Motor with TPI2C3701	SLIT117
Power+ Logic TPI2C595, 8-bit Shift Register with Low-Side Power DMOS Switches	SLPA004
(data converters)	
TLV1549 Application Report	SLAA005
TLC320AC01 Application Report	SLAA006
TLC320AD57C Sigma-Delta Stereo A-D Application Report	SLAA010
TLC2543 Application Report	SLAA012
Understanding Data Converters	SLAA013
TLC320AD58C Application Report	SLAA015
Multiple TLC320AC01/02 to TMS320C5x DSP	SLAA016
TLC32040 to TMS320	SLAU001A
(special functions)	
MSP430 Application Report	SLAAE10C
TL7726 Hex Clamping Circuit Application Report	SLAA004
TLC2932 PLL Application Report	SLAA011A

APPLICATION NOTES (Continued)

(multimedia)
Little/Big Endian TLC34074/6SLAT078

DATA MANUALS

TLC34076 Data ManualSLAS054
TLC34076-170 Data ManualSLAS076
TVP3010 Data ManualSLAS082
TVP3020 Data ManualSLAS080A
TVP3025 Data ManualSLAS090
TVP3026 Data ManualSLAS098B
TVP3030 Data ManualSLAS111
TVP3409 Data ManualSLAS092

EVALUATION KITS

Each EVM kit contains a fully-assembled evaluation board, a data sheet and a User's Guide for the evaluation board. Some kits also include applications notes, plus necessary software, cables and connectors.

To order any of the EVM kits listed, please call our toll-free order desk at 1-800-477-8924 x.5800.

Amplifiers

DC/DC converterTL5001EVM-097
Microphone mixerMIC/MIXEREVM
Plug-n-play platform & speakerTPABASEKITEVM
THS3001: 420-MHz high-speed current feedback amplifierTHS3001EVM
THS4001: High-speed, low-power amplifierTHS4001EVM
THS6002: Dual differential line drivers & receiversTHS6002EVM
TPA005D02: Audio power amplifierTPA005D02EVM
TPA0102: Audio power amplifierTPA0102EVM
TPA0103: Audio power amplifierTPA0103EVM
TPA0202: Audio power amplifierTPA0202EVM
TPA102: Audio power amplifierTPA102EVM
TPA112: Audio power amplifierTPA112EVM
TPA122: Audio power amplifierTPA122EVM
TPA1517DWP: Audio power amplifierTPA1517DWP EVM
TPA1517E: Audio power amplifierTPA1517EVM
TPA152: Audio power amplifierTPA152EVM
TPA301: Audio power amplifierTPA301EVM

Title

Order No.

EVALUATION KITS (Continued)

Amplifiers (Continued)
TPA302: Audio power amplifierTPA302EVM
TPA311: Audio power amplifierTPA311EVM
TPA311MSOP: Audio power amplifierTPA311MSOPEVM
TPA4860: Audio power amplifierTPA4860EVM
TPA4861: Audio power amplifierTPA4861EVM
TPA701: Audio power amplifierTPA701EVM
TPA711: Audio power amplifierTPA711EVM
TPA721: Audio power amplifierTPA721EVM

Microprocessors

MSP430 Starter KitMSP-STK430b320
MSP430 Evaluation KitMSP-EVK430b320

Transmitters & Receivers

LVDS Evaluation KitSN65LVDS31/32

Data Converters

TLC2543: 5 V, 12-bit ADCTLC2543EVM
TLC2932: 50 MHz phase-locked loopTLC2932EVM
TLC320AD55: 16-bit sigma-delta AICAD55-EVM
TLC320AD56: 16-bit sigma-delta AICAD56-EVM
TLC5510: 8-bit, 40-MSPS ADCTLC5510EVM
TLC5540: 8-bit, 40-MSPS ADCTLC5540EVM
TLC876: 10-bit, 20 MHz ADCTLC876EVM
TLV1544/8: 10-bit, 85-KSPS, ADCTLV1544EVM
TLV1562: 10/8/4-bit, 2/3/7-MSPS, reprogrammable ADCTLV1562EVM
TLV1570: 10-bit, 8-channel, 1.25-MSPS ADCTLV1570EVM
TLV1572: 10-bit, 1.25-MSPS ADCTLV1570EVM
TLV2543: 3 V, 12-bit ADCTLV2543EVM
TLV5510: low-voltage version of TLC5510TLV5510EVM
TLV5540: low-voltage version of TLC5540TLV5540EVM
TPS8735: 5 V, 200 mA inverting DC-DC converterTPS8735EVM
TPS9104: integrated power supply, audio power systemTPS9104EVM

Advanced Bus Solutions

PCI1210: PCI single-socket CardBus controllerPCI1210EVM
PCI1220: PCI dual-socket CardBus with external ZVPCI1220EVM
PCI1221: PCI dual-socket CardBus with external ZVPCI1221EVM
PCI1225: PCI dual-socket CardBus with external ZVPCI1225EVM
PCI1250A: PCI dual-socket CardBus with internal ZVPCI1250AEVM
PCI2031: PCI Pwr Mngmnt compliant, 32-bit, PCI-PCI bridgePCI2031EVM

Resources

A-4

Resources

Title	Order No.
EVALUATION KITS (Continued)	
Power Management Products	
TL1454: 5-V to 3.3-V and 12-V Dual output Buck and Boost converters	TL1454EVM-085
TL5001: 5-V to 3.3-V, 3-A Buck converter	TL5001EVM-087
TL5001: 5-V to 20-V/40-V Adjustable Boost converter	TL5001EVM-088
TL5001: 9-V to 3.3-V, 3-A Synchronous Buck converter	TL5001EVM-089
TL5001: 9-V to 3.3-V/5-V, 2.6-A Selectable Buck converter	TL5001EVM-097
TL5001: 5-V to 3.3-V, 3-A Small-profile Buck converter	TL5001EVM-101
TL5001: 5-V to 2.5-V, 3-A Small-profile Buck converter	TL5001EVM-102
TL5001: 5-V to 1.8-V, 3-A Small-profile Buck converter	TL5001EVM-103
TPS5633: 5-V to 3.3-V, 8-A Small-profile Sync Buck converter	TPS5633EVM-104
TPS5625: 5-V to 2.5-V, 8-A Small-profile Sync Buck converter	TPS5625EVM-105
TPS5618: 5-V to 1.8-V, 8-A Small-profile Sync Buck converter	TPS5618EVM-106
TPS5615: 5-V to 1.5-V, 8-A Small-profile Sync Buck converter	TPS5615EVM-115
TPS6735: 5-V to -5-V, 200-mA Buck-boost converter (inverter)	TPS6734EVM
EVALUATION KITS (Continued)	
1394 Designer Kits	
TSB12LV21 and 200 Mbps PHY — feature-rich board with Zoom Video signals on header, Zoom Video test connectors, S-RAM, serial EPROM, power circuit, room for additional circuitry, Windows 95 and Windows NT drivers	TSBKPCITST
TSB12C01A and 200 Mbps PHY — peripheral card with ISA (PC104) expansion I/F, RS-232 I/F, voice-band A/D converter, with sample software	TSBKPRPHRL
Three TSB12C01A LINK layers, TSB14C01 backplane PHY, 100 Mbps PHY and 200 Mbps PHY — backplane card with TMS320C52 controller and sample software	TSBKBACKPL
TSB12LV22 and TSB41LV03—1394a compliant host adapter, runs under Windows 98	TSBKOHCI403
TSB12LV21B and TSB41LV03—Board shows optional isolation build and includes software for Windows 95	
Note: EVM & Designer kits are not available in all countries. Please contact your local TI representative for availability and pricing.	

Internet

TI Semiconductor Home Page

www.ti.com/sc

TI Distributors

www.ti.com/sc/docs/distmenu.htm

Product Information Centers

Americas

Phone +1(972) 644-5580
 Fax +1(972) 480-7800
 Email sc-infomaster@ti.com

Europe, Middle East, and Africa

Phone
 Deutsch +49-(0) 8161 80 3311
 English +44-(0) 1604 66 3399
 Español +34-(0) 90 23 54 0 28
 Français +33-(0) 1-30 70 11 64
 Italiano +33-(0) 1-30 70 11 67
 Fax +44-(0) 1604 66 33 34
 Email epic@ti.com

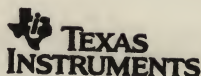
Japan

Phone
 International +81-3-3457-0972
 Domestic 0120-81-0026
 Fax
 International +81-3-3457-1259
 Domestic 0120-81-0036
 Email pic-japan@ti.com

Asia

Phone	+886-2-23786800	
International	<u>Local Access Code</u>	<u>TI Number</u>
Domestic	1-800-881-011	-800-800-1450
Australia	10810	-800-800-1450
China	800-96-1111	-800-800-1450
Hong Kong	000-116	-800-800-1450
India	001-801-10	-800-800-1450
Indonesia	080-551-2804	-
Korea	1-800-800-011	-800-800-1450
Malaysia	000-911	-800-800-1450
New Zealand	105-11	-800-800-1450
Philippines	800-0111-111	-800-800-1450
Singapore	080-006800	-
Taiwan	0019-991-1111	-800-800-1450
Thailand	886-2-2378-6808	
Fax	tiasia@ti.com	
Email		

© 1999 Texas Instruments Incorporated



Device Number Ordering Guide

Contents

Device Number Breakdown	B-2
Temperature Suffix Definitions	B-2
Carrier Suffix Options	B-2
Package Suffix Definitions	B-3

For technical assistance, requesting datasheets or samples, see Contact Information in Appendix A. Refer to Appendix C for a device index that includes literature and package information by device.

Device Number Breakdown

Typical Device Number

TLV 2442 A I D R

Products	Prefix Options	Typical Device Number	Optional Suffix	Temperature Suffix Options	Package Suffix Options	Carrier Suffix Options
Amplifiers & Comparators	LF, LM, LP, LT, MC, NE, OP, RC, SE, THS, TL, TLC, TLE, TLV, TPA, UA	2442	A, B	C, I, M, Q, Y, Z	D, DB, DBV, DCA, DGK, DGN, DGQ, DGS, DW, DWP, FK, J, JG, N, NE, NS, P, PS, PW, PWP, U, W, Y	LE, R, T
Data Converters	ICL, TL, TLC, TLV, TMS	0820	A	C, I, E, M, Q	CN, D, DA, DB, DL, DW, DWB, FK, FN, FR, J, JB, N, NS, NW, P, PFB, PM, PT, PW	LE, R
Data Transmission	AM, LT, MAX, SN, TL, UA, UC	75LBC176	A, B	C, I, M	D, DB, DGG, DL, DW, FK, FN, GFN, HV, J, JG, N, NS, NT, P, PAG, PBK, PBM, PDV, PFB, PFP, PGF, PH, PM, PN, PS, PT, PW, PZ, WN	LE, R
Power Supply Products	LM, LT, MC, SG, TL, TLC, TLE, TLV, TPS, UA, UC	2202	A	C, I, M, Q, Y	D, DAP, DB, DBV, DCS, DF, DW, FK, J, JG, KC, KTE, KTG, KTP, LP, N, NS, P, PK, PS, PT, PW, PWP, U, Y	LE, R
Power Drivers	DS, L, SN, TPIC ULN	2101	n/a	n/a	D, DA, DB, DW, J, KTA, DWP, KTC, KTR, KTS, N, NE, P, PS	R
Special Functions	CDC, MSP, PMS	430	S	I	D, DB, DGG, DL, DW, FN, FZ, HFD, N, PAH, PG, PJM, PM, PW	n/a

Temperature Suffix Definitions

Some temperature suffixes have alternative temperature ranges.

- C = 0 to 70°C (Commercial)
- I, E = -40 to 85°C (Industrial)
- M = -55 to 125°C (Military)
- Q = -40 to 125°C
- Y = 25°C
- Z = -40 to 150°C

Carrier Suffix Options

- LE = Available only Left-Ended Taped-and-Reeled
- R = Available Taped-and-Reeled
- T = Available Taped-and-Reeled (small quantity)

Package Suffix Definitions

Refer to Appendix C for package availability by device number.

D:	Small Outline Package (SOP)	KTP:	Plastic Flange-Mount Package (PFM)
DA:	Thin Shrink Small-Outline Package (TSSOP)	KTR:	Plastic Flange-Mount Package (PFM)
DAP:	PowerPAD™ Plastic Small-Outline Package	KTS:	Plastic Flange-Mount Package (PFM)
DB:	Shrink Small-Outline Package (SSOP)	LP:	Plastic Cylindrical Package (TO/SOT)
DBV:	Small-Outline Transistor (SOT-23)	MDN:	Metal Quad Flat Package (MQFP)
DCA:	PowerPAD Plastic Small-Outline Package (TSSOP)	MEP:	Metal Quad Flat Package (MQFP)
DF:	Shrink Small-Outline Package (SSOP)	N:	Plastic Dual-In-Line Package (PDIP)
DGG:	Plastic Thin Small-Outline Package (TSSOP)	NE:	Plastic Dual-In-Line Package (PDIP)
DGK:	Plastic Small-Outline Package (MSOP)	NS:	Plastic Small-Outline Package (SOP)
DGN:	PowerPAD Plastic Small-Outline Package (MSOP)	NT:	Plastic Dual-In-Line Package (PDIP)
DGQ:	PowerPAD Plastic Small-Outline Package (MSOP)	NW:	Plastic Dual-In-Line Package (PDIP)
DGS:	Plastic Small-Outline Package (MSOP)	P:	Plastic Dual-In-Line Package (PDIP)
DL:	Shrink Small-Outline Package (SSOP)	PAG:	Plastic Quad Flat Package (TQFP)
DW:	Small Outline Package (SOP)	PAH:	Plastic Quad Flat Package (TQFP)
DWB:	Plastic Small-Outline Package (SOP)	PBK:	Plastic Quad Flat Package (TQFP)
DWP:	PowerPAD Thermally Enhanced Small-Outline Package (HSOP)	PBM:	Plastic Quad Flat Package (QFP)
FK:	Leadless Ceramic Chip-Carrier Package (LCCC)	PCD:	Plastic Quad Flat Package (HQFP)
FN:	Plastic J-Leaded Chip-Carrier Package (PLCC)	PCE:	Plastic Quad Flat Package (HQFP)
FR:	Plastic Quad Flat Package (QFP)	PDV:	Plastic Quad Flat Package (TQFP)
FZ:	J-Leaded Ceramic Chip Carrier	PFB:	Plastic Quad Flat Package (TQFP)
GA:	Ceramic Pin Grid Array Package (CPGA)	PFP:	PowerPAD Plastic Quad Flat Package
GFN:	Plastic Ball Grid Array (BGA)	PG:	Plastic Quad Flat Package (QFP)
HFD:	Ceramic Quad Flatpack	PGF:	Plastic Quad Flat Package (TQFP)
HV:	Ceramic Quad Flat Package (CFP)	PH:	Plastic Quad Flat Package (QFP)
J:	Side-Braze Ceramic Package (CDIP-SB)	PJM:	Plastic Quad Flat Package (TQFP)
JG:	Ceramic Dual-In-Line Package (CDIP)	PK:	Plastic Thermally Enhanced Single-In-Line Package (HSIP)
JW:	Ceramic Dual-In-Line Package (CDIP)	PM:	Low Profile Quad Flat Package (LQFP)
KC:	Cylindrical Package (TO/SOT)	PN:	Plastic Quad Flat Package (TQFP)
KTA:	Plastic Flange-Mount Package (PFM)	PPA:	Thermally Enhanced Quad Flat Package (HQFP)
KTC:	Plastic Flange-Mount Package (PFM)	PS:	Small-Outline Package (SOP)
KTE:	Plastic Flange-Mount Package (PFM)	PT:	Plastic Thin Quad Flat Package (HLQFP)
KTG:	Plastic Flange-Mount Package (PFM)	PW:	Thin Shrink Small-Outline Package (TSSOP)
		PWP:	Thermally Enhanced PowerPAD Package (HTSSOP)
		PZ:	Plastic Quad Flat Package (TQFP)
		U:	Ceramic Flat Package (CFP)
		W:	Ceramic Flat Package (CFP)
		WN:	Ceramic Quad Flat Package (CFP)
		Y:	Unpackaged chip

TI Device Index for Mixed-Signal & Analog Products

For technical assistance, requesting datasheets or samples, see Contact Information in Appendix A.
For device number and package definitions, see Appendix B.

C-2

Devices released since 1997 Designer's Guide

TI Device Index for Mixed-Signal & Analog Products

TI Device	Family	Logic	Memory	Package
SN75374	Power Drivers	5	SLRS028	D, N
SN75437A	Power Drivers	5	SLRS019A	NE
SN754410	Power Drivers	5	SLRS007B	NE
SN75451B	Power Drivers	5	SLRS021A	D, P
SN75452B	Power Drivers	5	SLRS021A	D, P, PS
SN75453B	Power Drivers	5	SLRS021A	D, P
SN75454B	Power Drivers	5	SLRS021A	D, P
SN75462	Power Drivers	5	SLRS022A	D, P
SN75463	Power Drivers	5	SLRS022A	D, P
SN75468	Power Drivers	5	SLRS023B	D, N
SN75469	Power Drivers	5	SLRS023B	D, N
SN75471	Power Drivers	5	SLRS024	D, P
SN75472	Power Drivers	5	SLRS024	D, P
SN75477	Power Drivers	5	SLRS025A	D, P
SN75478	Power Drivers	5	SLRS025A	D, P
SN75478A	Power Drivers	5	SLRS216B	DGG, DL
SN75ALS056	Data Transmission Products	3	SLLS028G	DW, N
SN75ALS057	Data Transmission Products	3	SLLS028G	DW, N
SN75ALS085	Data Transmission Products	3	SLLS054B	DW, NT
SN75ALS117	Data Transmission Products	3	SLLS154A	N, NS
SN75ALS178	Data Transmission Products	3	SLLS154A	N, NS
SN75ALS160	Data Transmission Products	3	SLLS018D	DW, N
SN75ALS161	Data Transmission Products	3	SLLS018D	DW, N
SN75ALS162	Data Transmission Products	3	SLLS020C	DW, N
SN75ALS170	Data Transmission Products	3	SLLS055D	DW, J
SN75ALS170A	Data Transmission Products	3	SLLS055D	DW, J
SN75ALS171	Data Transmission Products	3	SLLS056D	DW, J
SN75ALS171A	Data Transmission Products	3	SLLS056D	DW, J
SN75ALS172A	Data Transmission Products	3	SLLS121D	DW, N
SN75ALS173	Data Transmission Products	3	SLLS132C	N, NS
SN75ALS174	Data Transmission Products	3	SLLS122E	DW, N
SN75ALS175	Data Transmission Products	3	SLLS131C	N, NS
SN75ALS176	Data Transmission Products	3	SLLS040E	D, P
SN75ALS176A	Data Transmission Products	3	SLLS040E	D, P
SN75ALS176B	Data Transmission Products	3	SLLS040E	D, P
SN75ALS176C	Data Transmission Products	3	SLLS040E	D, P
SN75ALS180	Data Transmission Products	3	SLLS052E	D, P
SN75ALS191	Data Transmission Products	3	SLLS052E	D, P
SN75ALS192	Data Transmission Products	3	SLLS007D	D, N
SN75ALS193	Data Transmission Products	3	SLLS008D	D, J, N
SN75ALS194	Data Transmission Products	3	SLLS009D	D, N
SN75ALS195	Data Transmission Products	3	SLLS010D	J, N
SN75ALS197	Data Transmission Products	3	SLLS045B	D, J, N
SN75ALS199	Data Transmission Products	3	SLLS046C	D, N
SN75ALS154	Data Transmission Products	3	SLLS151C	DW, N
SN75ALS167	Data Transmission Products	3	SLLS150C	N, NS
SN75ALS168	Data Transmission Products	3	SLLS150C	N, NS
SN75ALS169	Data Transmission Products	3	SLLS146C	D, DW, N

TI Device Index for Mixed-Signal & Analog Products

TI Device	Family	Logic	Memory	Package
SN75C185	Data Transmission Products	3	SLLS065D	DW, N
SN75C188	Data Transmission Products	3	SLLS039F	D, DB, N
SN75C189	Data Transmission Products	3	SLLS041E	D, N
SN75C190A	Data Transmission Products	3	SLLS041E	D, DB, N
SN75LC172	Data Transmission Products	3	SLLS163	DW, N
SN75LC173	Data Transmission Products	3	SLLS170A	D, N
SN75LC174	Data Transmission Products	3	SLLS162	DW, N
SN75LC175	Data Transmission Products	3	SLLS171	D, N
SN75LC176	Data Transmission Products	3	SLLS067D	D, P
SN75LC179	Data Transmission Products	3	SLLS173B	D, P
SN75LC180	Data Transmission Products	3	SLLS174A	D, N
SN75LC184	Data Transmission Products	3	SLLS236A	D, P
SN75LC187	Data Transmission Products	3	SLLS180C	DG
SN75LC241	Data Transmission Products	3	SLLS157D	DW, DW
SN75LC771	Data Transmission Products	3	SLLS226A	DW, NS
SN75LC773	Data Transmission Products	3	SLLS247C	DW
SN75LC775	Data Transmission Products	3	SLLS216A	DW
SN75LC776	Data Transmission Products	3	SLLS221A	DW
SN75LC777	Data Transmission Products	3	SLLS227	DW
SN75LC784	Data Transmission Products	3	SLLS187A	DW
SN75LC786	Data Transmission Products	3	SLLS184	DW
SN75LC968	Data Transmission Products	3	SLLS179B	DL
SN75LC970A	Data Transmission Products	3	SLLS215A	DL
SN75LC971A	Data Transmission Products	3	SLLS186B	DL
SN75LC978	Data Transmission Products	3	SLLS134E	DL
SN75LP185A	Data Transmission Products	3	SLLS257G	DW
SN75LP185	Data Transmission Products	3	SLLS256D	DW, DW, MT, PW
SN75LV4737A	Data Transmission Products	3	SLLS178A	DB
SN75LV4767A	Data Transmission Products	3	SLLS242	DB
SN75LV581	Data Transmission Products	3	SLLS258A	DGG
SN75LV582	Data Transmission Products	3	SLLS259C	DGG
SN75LV583	Data Transmission Products	3	SLLS271	DGG
SN75LV584	Data Transmission Products	3	SLLS270A	DGG
SN75LV585	Data Transmission Products	3	SLLS268B	DGG
SN75LV586	Data Transmission Products	3	SLLS268A	DGG
SN95176B	Data Transmission Products	2	SLLS026A	FK, JG
TOM26013	Wireless and Telecom	2	SCTS1011H	DW, N
TOM26013A	Wireless and Telecom	2	SCTS030E	DW, N
TOM26014	Wireless and Telecom	2	SCTS030E	DW
TOM26014A	Wireless and Telecom	2	SCTS030E	DW
TOM26016	Wireless and Telecom	2	SCTS030E	DW, N
TOM26016A	Wireless and Telecom	2	SCTS030E	DW, N
TOM26018	Wireless and Telecom	2	SCTS030E	DW, N
TOM26019	Wireless and Telecom	2	SCTS030E	DW, N
TOM26023	Wireless and Telecom	2	SCTS030E	DW, N
TOM320AC36	Data Converters	2	SLWS003G	DW, N, PT
TOM320AC37	Data Converters	2	SLWS003G	DW, N

* Devices introduced since 1987 Designer's Guide

TI Device	Family	Section	Literature	Package
TL16NP100A	Data Transmission Products	3	SLI5200C	FN, PT
TL16NP200A	Data Transmission Products	3	SLI5274A	PH
TL16NP650A	Data Transmission Products	3	SLI5190B	FN
TL2217-285	Power Supply Products	4	SLV5068E	KC, PW
TL2218-285	Power Supply Products	4	SLV5072C	PW
TL3016†	Comparators	1	SLCS130B	D, PW
TL3116†	Comparators	1	SLCS132B	D, PW
TL317	Power Supply Products	4	SLV5044B	D, LP
TL3695	Data Transmission Products	3	SLV5044C	D, P
TL393	Comparators	1	SLCS120A	D, P, PW
TL430	Power Supply Products	4	SLV5050A	LP
TL431	Power Supply Products	4	SLV5005I	D, LP, P, PK, PS, PW
TL431A	Power Supply Products	4	SLV5005I	D, LP, P
TL494	Power Supply Products	4	SLV5074A	D, J, N, NS, PW
TL497A	Power Supply Products	4	SLV5009C	D, J, N, NS
TL498A	Power Supply Products	4	SLV5028B	P, PS
TL5001	Power Supply Products	4	SLV5084D	O, D, P, PS
TL5001	Data Converters	2	SLAS026	CN
TL5632	Data Converters	2	SLAS091	FR
TL594	Power Supply Products	4	SLV5062B	D, N
TL598	Power Supply Products	4	SLV5063B	D, FR, J, N
TL712	Comparators	1	SLCS002B	D, P, PS
TL714	Comparators	1	SLCS015	D, P
TL750L05	Power Supply Products	4	SLV5017G	D, KC, LP, P
TL750L08	Power Supply Products	4	SLV5017G	D, KC, LP, P
TL750L10	Power Supply Products	4	SLV5017G	D, KC, LP, P
TL750L12	Power Supply Products	4	SLV5017G	D, KC, LP, P
TL750M05	Power Supply Products	4	SLV5021F	KC, KTE
TL750M08	Power Supply Products	4	SLV5021F	KC, KTE
TL750M10	Power Supply Products	4	SLV5021F	KC, KTE
TL750M12	Power Supply Products	4	SLV5021F	KC, KTE
TL751L05	Power Supply Products	4	SLV5017G	D, P
TL751L08	Power Supply Products	4	SLV5017G	D, P
TL751L10	Power Supply Products	4	SLV5017G	D, P
TL751L12	Power Supply Products	4	SLV5017G	D, P
TL751M05	Power Supply Products	4	SLV5021F	KC, KTG
TL751M08	Power Supply Products	4	SLV5021F	KC, KTG
TL751M10	Power Supply Products	4	SLV5021F	KC, KTG
TL751M12	Power Supply Products	4	SLV5021F	KC, KTG
TL751P05	Power Supply Products	4	SLV5073A	PW
TL751P08	Power Supply Products	4	SLV5073A	PW
TL751P10	Power Supply Products	4	SLV5073A	PW
TL751P12	Power Supply Products	4	SLV5073A	PW
TL751P48	Power Supply Products	4	SLV5073A	PW
TL7702A	Power Supply Products	4	SLV5028C	D, P
TL7702B	Power Supply Products	4	SLV5037G	D, P
TL7705A	Power Supply Products	4	SLV5028C	D, P, PS

TI Device	Family	Section	Literature	Package
TM3320AC39	Data Converters	2	SLW5004B	DW, N, PT
TM3320AC54	Wireless and Telecom	2	SCIS043A	DW, N
TM3320AC56	Data Converters	2	SLW5016A	DW
TM3320C144	Wireless and Telecom	2	SLWA006	DW
TM3320C171	Wireless and Telecom	2	SLWA006	DW, N
THS3001†	Amplifiers	1	SLW5040A	DL
THS4001†	Amplifiers	1	SLOS217	D
THS6002†	Amplifiers	1	SLOS266	D
THS6002†	Amplifiers	1	SLOS202C	DWP
THS8012	Power Supply Products	1	SLOS226A	DWP
TL1300	Power Supply Products	4	SOE5019A	DCS, N
TL1300A	Power Supply Products	4	SOE5019A	DCS, N
TL1900	Data Transmission Products	3	SLI5228B	PS, PW
TL1900G†	Data Transmission Products	3	SLI5248A	PAG
TL1900S†	Power Supply Products	4	SLV5065E	FK, J, KC, PW
TL1922	Amplifiers	1	SLOS076	D, P
TL031	Amplifiers	1	SLOS180A	D, P, PW
TL032	Amplifiers	1	SLOS180A	D, P, PW
TL034	Amplifiers	1	SLOS180A	D, N, PW
TL051	Amplifiers	1	SLOS178	D, P
TL052	Amplifiers	1	SLOS178	D, P
TL054	Amplifiers	1	SLOS178	D, N
TL061	Amplifiers	1	SLOS178	D, N
TL062	Amplifiers	1	SLOS078E	D, P, PS, PW
TL064	Amplifiers	1	SLOS078E	D, N, NS, PW
TL070	Amplifiers	1	SLOS121A	D, P
TL071	Amplifiers	1	SLOS080D	D, JG, P, PS, PW
TL072	Amplifiers	1	SLOS080D	D, P, PS
TL074	Amplifiers	1	SLOS080D	D, J, N, PW
TL081	Amplifiers	1	SLOS080D	D, P, PW
TL082	Amplifiers	1	SLOS081D	D, JG, P, PS, PW
TL084	Amplifiers	1	SLOS081D	D, J, N, NS, PW
TL1431	Power Supply Products	4	SLV5062C	D, LP
TL1451A	Power Supply Products	4	SLV5024C	DB, N, NS, PW
TL1454	Power Supply Products	4	SLV5086B	D, N, PW
TL145406	Data Transmission Products	3	SLI5185A	DW, N
TL160450	Data Transmission Products	3	SLV5037E	FN, N
TL160451	Data Transmission Products	3	SLV5038B	FN
TL160452	Data Transmission Products	3	SLV5038B	FN
TL160453	Data Transmission Products	3	SLV5136B	FN, N, PT
TL160550C	Data Transmission Products	3	SLI5177E	FN, N, PB, PT
TL160552A	Data Transmission Products	3	SLI5189C	FN, HV, PN
TL160554	Data Transmission Products	3	SLI5165D	FN
TL160750	Data Transmission Products	3	SLI5191C	FN, PM
TL160754†	Data Transmission Products	3	SLI5279	FN, PN
TL160754B	Data Transmission Products	3	SLI5275A	PZ
TL1607552	Data Transmission Products	3	SLI5222A	PH

† Devices released since 1987 Designer's Guide

TI Device Index for Mixed-Signal & Analog Products

Flighting	Family	Locks	Location	Part No.
TL7705B	Power Supply Products	4	SLS0537G	D, P
TL7709A	Power Supply Products	4	SLS028C	D, P
TL7712A	Power Supply Products	4	SLS028C	D, P
TL7715A	Power Supply Products	4	SLS028C	D, P
TL7757	Power Supply Products	4	SLS034D	D, L, P, PK
TL7759	Power Supply Products	4	SLS034D	D, P, PW
TL7770-15	Power Supply Products	4	SLS039D	DW, N
TL7770-5	Power Supply Products	4	SLS039D	DW, N
TL780-05	Power Supply Products	4	SLS065D	KC, KTE
TL780-12	Power Supply Products	4	SLS065D	KC, KTE
TL780-15	Power Supply Products	4	SLS065D	KC, KTE
TL783	Power Supply Products	4	SLS069C	KC
TL78820A	Data Converters	2	SLS064A	D8, DW, FN, N
TL78831	Data Converters	2	SLS107B	D, P
TL78832	Data Converters	2	SLS107B	D, P
TL78834	Data Converters	2	SLS094C	D, N
TL78838	Data Converters	2	SLS094C	DW, N
TL78107B	Amplifiers	1	SLS0179	D, P
TL781079	Amplifiers	1	SLS0179	D, N
TL78151	Data Converters	2	SLS073C	DW, FN, N
TL78152	Data Converters	2	SLS062E	D8, FN, J, N
TL781543	Data Converters	2	SLS062E	D8, DW, FN, N
TL781549	Data Converters	2	SLS062E	D8, DW, FN, N
TL781550	Data Converters	2	SLS069C	D, P
TL781551	Data Converters	2	SLS043C	FK, FN, J, NW
TL78201	Amplifiers	1	SLS0175	FN
TL782201	Amplifiers	1	SLS0175	D, JG, P
TL78232	Amplifiers	1	SLS0176	D, PK, JG, P, PW, W
TL78254	Amplifiers	1	SLS0179	D, PK, J, N, PW, W
TL78262	Amplifiers	1	SLS0177	D, P, PW
TL78264	Amplifiers	1	SLS0177	D, N, PW
TL78272	Amplifiers	1	SLS0190	D, P, PW
TL78274	Amplifiers	1	SLS0190	D, N, PW
TL78281	Amplifiers	1	SLS0001E	D, P
TL78282	Amplifiers	1	SLS0001E	D, P
TL78283	Amplifiers	1	SLS003F	D, P
TL78284	Amplifiers	1	SLS003F	D, P
TL78285	Data Converters	2	SLS0790	D8, DW, FN, J, N
TL78286	Amplifiers	1	SLS002B	D, P
TL78287	Amplifiers	1	SLS003F	D, N
TL78288	Amplifiers	1	SLS003F	D, N
TL78289	Amplifiers	1	SLS003F	D, N
TL78290	Amplifiers	1	SLS003F	D, N
TL78291	Amplifiers	1	SLS003F	D, P, PW
TL78292	Amplifiers	1	SLS0618	D, P, PS, PW
TL78293	Amplifiers	1	SLS0628	D, N, PS, PW
TL78294	Amplifiers	1	SLS0618	D, P, PS

+ Devices released since 1997 Designer's Guide

TI Device Index for Mixed-Signal & Analog Products

TL Device	Family	Section	Luminance	Pattern
TLc279	Amplifiers	1	SL050928	D, FK, J, N
TLc271	Amplifiers	1	SL05154	D
TLc272	Amplifiers	1	SL050628	D, P, PS, PW
TLc274	Amplifiers	1	SL050638	D, N, NS, PW
TLc275	Amplifiers	1	SL051428	D, P
TLc276	Amplifiers	1	SL050538	D, N
TLc277	Amplifiers	1	SL050518	D, P, PS, PW
TLc278	Amplifiers	1	SL050938	D, N, PW
TLc279	Amplifiers	1	SL050518	D, P
TLc270	Amplifiers	1	SL050938	D, N, NS
TLc271	Amplifiers	2	SLAS097E	PW
TLc272	Data Converters	2	SLAS156A	PW
TLc273	Data Converters	2	SLAS146B	DP
TLc274	Data Converters	2	SLAS014E	FN, N
TLc275	Data Converters	2	SLAS017F	FK, FN, J, JB, N
TLc276	Data Converters	2	SLAS017F	FN
TLc277	Data Converters	2	SLAS028B	FK, FN, J, JB, N
TLc278	Data Converters	2	SLAS049A	FN, N
TLc279	Data Converters	2	SLAS057D	DW, FN, PM
TLc280	Data Converters	2	SLAS084C	FN, PM
TLc281	Data Converters	2	SLAS131B	DW, PT
TLc282	Data Converters	2	SLAS01318	DW, PT
TLc283	Data Converters	2	SLAS202	PM
TLc284	Data Converters	2	SLAS206	PT
TLc285	Data Converters	2	SLAS085	DW
TLc286	Data Converters	2	SLAS101A	FN, PT
TLc287	Data Converters	2	SLAS086A	DW
TLc288	Data Converters	2	SLAS102	DW
TLc289	Data Converters	2	SLAS144	DL
TLc290	Data Converters	2	SLAS141	FN, PM
TLc291	Data Converters	2	SLAS173	FN, PM
TLc292	Data Converters	2	SLAS185	PT
TLc293	Comparators	1	SLCS119	D, N, PW
TLc294	Comparators	1	SLCS016	D, P
TLc295	Comparators	1	SLCS116B	D, N
TLc296	Comparators	1	SLCS013D	D, P, PS, PW
TLc297	Comparators	1	SLCS117A	D, N, NS, PW
TLc298	Comparators	1	SLCS114A	D, P, PW
TLc299	Comparators	1	SLCS116A	D, N, PW
TLc300	Comparators	1	SLCS118A	D, P, PW
TLc301	Comparators	1	SLCS119C	D, P, PW
TLc302	Amplifiers	1	SL05221	D
TLc303	Amplifiers	1	SL05221	D
TLc304	Data Converters	2	SLAS065A	DW, FN, N
TLc305	Data Converters	2	SLAS065A	DW, FN, N
TLc306	Data Converters	2	SLAS076A	DW, FN, N
TLc307	Data Converters	2	SLAS066B	FN, N
TLc308	Data Converters	2	SLAS066B	FN, N

Devices released since 1997 Designer's Guide

C-7

TI Device Index for Mixed-Signal & Analog Products

TI Device	Family	Section	Literature	Package
TLV320AC37	Data Converters	2	SLWS0068	DW, N, PT
TLV320AC56	Data Converters	2	SLWS0448	DW
TLV331A	Power Supply Products	4	SLVS139A	DBV, LP
TLV5510	Data Converters	2	SLAS124	NS
TLV5590	Data Converters	2	SLAS134B	D
TLV5594	Data Converters	2	SLAS176A	D, PW
TLV5513	Data Converters	2	SLAS174A	DW, PW
TLV5514	Data Converters	2	SLAS188	D, PW
TLV5516	Data Converters	2	SLAS152A	D
TLV5519	Data Converters	2	SLAS172B	DW, PW
TLV5520	Data Converters	2	SLAS110A	D, N
TLV5521	Data Converters	2	SLAS138B	D, N
TLV5528	Data Converters	2	SLAS108A	DW, N
TLV5529	Data Converters	2	SLAS077D	DWB
TLV557014A	Data Converters	2	SLAS072D	DW, N
TP3054A	Wireless and Telecom	2	SCTS042A	DW, N
TP3054B	Wireless and Telecom	2	SLSV072A	DW, N
TP3056B	Wireless and Telecom	2	SCTS026C	DW, N
TP3057A	Wireless and Telecom	2	SCTS042A	DW, N
TP3057B	Wireless and Telecom	2	SCTS031D	DW, N
TP3064B	Wireless and Telecom	2	SCTS026C	DW, N
TP3067A	Wireless and Telecom	2	SCTS031D	DW, N
TP3067B	Wireless and Telecom	2	SLS0227A	DCA
TPA005D02	Amplifiers	1	SLS0166D	PWP
TPA0102	Amplifiers	1	SLS0167	PWP
TPA0103	Amplifiers	1	SLS0205	PWP
TPA0202	Amplifiers	1	SLS0213B	DGN
TPA102	Amplifiers	1	SLS0212B	D, DGN
TPA112	Amplifiers	1	SLS0211B	D, DGN
TPA1571	Amplifiers	1	SLS0162A	DWP, NE
TPA152	Amplifiers	1	SLS0210	D
TPA301	Amplifiers	1	SLS0298B	D, DGN
TPA302	Amplifiers	1	SLS0174A	D
TPA311	Amplifiers	1	SLS0207A	D, DGN
TPA4860	Amplifiers	1	SLS0164	D
TPA4861	Amplifiers	1	SLS0163	D
TPA701	Amplifiers	1	SLS0229	D, DGN
TPA711	Amplifiers	1	SLS0230	D, DGN
TPA712	Amplifiers	1	SLS0231	D, DGN
TPA713	Amplifiers	1	SLS067	DWP
TPIC0107B	Power Control Products	5	SLS068	DWP
TPIC0108B	Power Control Products	5	SLS071	KTR, KTS
TPIC1310	Power Drivers	5	SLS060	D, N
TPIC2101	Power Drivers	5	SLS049	KTA
TPIC2401	Power Drivers	5	SLS048A	KTC
TPIC2601	Power Drivers	5	SLS056A	DW, NE
TPIC2603	Power Drivers	5	SLS019A	J, N

TI Device	Family	Section	Literature	Package
TPIC3701	Power Drivers	5	SLIS081A	DA
TPIC4401	Power Drivers	5	SLIS088	DA
TPIC4401	Power Drivers	5	SLIS062A	DB
TPIC4402	Power Drivers	5	SLIS062A	DB
TPIC4403	Power Drivers	5	SLIS062A	DB
TPIC4601	Power Drivers	5	SLIS055A	DB
TPIC4602	Power Drivers	5	SLIS055A	DB
TPIC4603	Power Drivers	5	SLIS055A	DB
TPIC6259	Power Drivers	5	SLIS009A	DW, N
TPIC6273	Power Drivers	5	SLIS011A	DW, N
TPIC6595	Power Drivers	5	SLIS010A	DW, N
TPIC6A259	Power Drivers	5	SLIS004B	DW, NE
TPIC6A595	Power Drivers	5	SLIS005A	DW, NE
TPIC6B259	Power Drivers	5	SLIS030	DW, N
TPIC6B273	Power Drivers	5	SLIS031	DW, N
TPIC6B955	Power Drivers	5	SLIS032	DW, N
TPIC6C595	Power Drivers	5	SLIS061	D, N
TPS1100	Power Supply Products	4	SLVS078C	D, PW
TPS1101	Power Supply Products	4	SLVS079C	D, PW
TPS1120	Power Supply Products	4	SLVS080A	D
TPS2010	Power Supply Products	4	SLVS097A	D, PW
TPS2011	Power Supply Products	4	SLVS097A	D, PW
TPS2012	Power Supply Products	4	SLVS097A	D, PW
TPS2013	Power Supply Products	4	SLVS097A	D, PW
TPS2014	Power Supply Products	4	SLVS159B	D, P
TPS2015	Power Supply Products	4	SLVS159B	D, P
TPS2041	Power Supply Products	4	SLVS172A	D, P
TPS2042	Power Supply Products	4	SLVS173A	D, P
TPS2044	Power Supply Products	4	SLVS174A	D
TPS2051	Power Supply Products	4	SLVS172A	D, P
TPS2052	Power Supply Products	4	SLVS173A	D, P
TPS2054	Power Supply Products	4	SLVS174A	D
TPS2055	Power Supply Products	4	SLVS1280	DB, DF
TPS2061	Power Supply Products	4	SLVS138B	DAP, DB, DF
TPS2062	Power Supply Products	4	SLVS156C	DB
TPS211	Power Supply Products	4	SLVS132D	D, P, PW
TPS212	Power Supply Products	4	SLVS132D	D, P, PW
TPS213	Power Supply Products	4	SLVS132D	D, P, PW
TPS214	Power Supply Products	4	SLVS132D	D, P, PW
TPS215	Power Supply Products	4	SLVS160A	DBV
TPS216	Power Supply Products	4	SLVS160A	DBV
TPS217	Power Supply Products	4	SLVS160A	DBV
TPS218	Power Supply Products	4	SLVS160A	DBV
TPS219	Power Supply Products	4	SLVS160A	DBV
TPS220	Power Supply Products	4	SLVS160A	DBV
TPS221	Power Supply Products	4	SLVS160A	DBV
TPS222	Power Supply Products	4	SLVS160A	DBV
TPS223	Power Supply Products	4	SLVS160A	DBV
TPS224	Power Supply Products	4	SLVS160A	DBV
TPS225	Power Supply Products	4	SLVS160A	DBV

Device Index for Mixed-Signal & Analog Products

Time	Part	Power	Power	
TPS3823-30†	Power Supply Products	4	SLVS165A	DBV
TPS3823-33†	Power Supply Products	4	SLVS165A	DBV
TPS3823-50†	Power Supply Products	4	SLVS165A	DBV
TPS3824-23†	Power Supply Products	4	SLVS165A	DBV
TPS3825-30†	Power Supply Products	4	SLVS165A	DBV
TPS3824-33†	Power Supply Products	4	SLVS165A	DBV
TPS3824-50†	Power Supply Products	4	SLVS165A	DBV
TPS5210†	Power Supply Products	4	SLVS171	DW
TPS5615†	Power Supply Products	4	SLVS177	0, PWP
TPS5618†	Power Supply Products	4	SLVS177	0, PWP
TPS5625†	Power Supply Products	4	SLVS177	0, PWP
TPS5633†	Power Supply Products	4	SLVS177	0, PWP
TPS5904	Power Supply Products	4	SOE5016D	P
TPS5904A	Power Supply Products	4	SOE5016D	P
TPS5906†	Power Supply Products	4	SOE5098B	DGS, P
TPS5934	Power Supply Products	4	SLVS127	D, P
TPS6735	Power Supply Products	4	SLVS141A	D, P
TPS6755	Power Supply Products	4	SLVS135	D, P
PS7101	Power Supply Products	4	SLVS902F	D, P, PW
PS7102†	Power Supply Products	4	SLVS162A	D, P, PW
PS7143	Power Supply Products	4	SLVS302F	D, P, PW, PWP
PS7148	Power Supply Products	4	SLVS902F	D, P, PW
PS7150	Power Supply Products	4	SLVS902F	D, P, PW, PWP
PS7105†	Power Supply Products	4	SLVS152A	PWP
PS71H01	Power Supply Products	4	SLVS152A	PWP
PS71H33	Power Supply Products	4	SLVS152A	PWP
PS71H48	Power Supply Products	4	SLVS152A	PWP
PS71H50	Power Supply Products	4	SLVS152A	PW
PS7201	Power Supply Products	4	SLVS102E	D, P, PW
PS7225†	Power Supply Products	4	SLVS102F	D, P, PW
PS7230†	Power Supply Products	4	SLVS102F	D, P, PW
PS7233	Power Supply Products	4	SLVS102E	D, P, PW
PS7248	Power Supply Products	4	SLVS102E	D, P, PW
PS7250	Power Supply Products	4	SLVS102E	D, P, PW
PS7301	Power Supply Products	4	SLVS124E	D, P, PW
PS7330†	Power Supply Products	4	SLVS124E	D
PS7333	Power Supply Products	4	SLVS124E	D, P, PW
PS7348	Power Supply Products	4	SLVS124E	D, P, PW
PS7350	Power Supply Products	4	SLVS124E	D, P, PW
PS73H030†	Power Supply Products	4	SLVS167	PW
PS7603†	Power Supply Products	4	SLVS144A	DBV
PS7602†	Power Supply Products	4	SLVS144A	DBV
PS7603†	Power Supply Products	4	SLVS144A	DBV
PS7603†	Power Supply Products	4	SLVS144A	DBV
PS7605†	Power Supply Products	4	SLVS144A	DBV
PS9103	Power Supply Products	4	SLVS131A	PW
PS9104	Power Supply Products	4	SLVS133A	PT

†Devices released since 1997 Designer's Guide

TI Device Index for Mixed-Signal & Analog Products

TI Device	Family	Section	Literature	Package
UA79M05	Power Supply Products	4	SLVS060C	KC, KTP
UA79M08	Power Supply Products	4	SLVS060C	KC, KTP
UA79M12	Power Supply Products	4	SLVS060C	KC, KTP
UA79M15	Power Supply Products	4	SLVS060C	KC, KTP
UA9636A	Data Transmission Products	3	SLLS110B	D, JG, P
UA9637A	Data Transmission Products	3	SLLS111B	D, JG, P
UA9638	Data Transmission Products	3	SLLS112C	D, P
UA9639	Data Transmission Products	3	SLLS113C	D, P
UC2843	Power Supply Products	4	SLVS038B	D, P
UC2844	Power Supply Products	4	SLVS038B	D, P
UC2845	Power Supply Products	4	SLVS038B	D, P
UC3842	Power Supply Products	4	SLVS038B	D, P
UC3843	Power Supply Products	4	SLVS038B	D, P
UC3844	Power Supply Products	4	SLVS038B	D, P
UC3845	Power Supply Products	4	SLVS038B	D, P
ULN2002A	Power Drivers	5	SLRS027	D, N
ULN2003A	Power Drivers	5	SLRS027	D, N
ULN2004A	Power Drivers	5	SLRS027	D, N

Notes

Notes

Notes

1/1/2018

1/1/2018

1/1/2018

1/1/2018

1/1/2018

Product Information

1/1/2018

1/1/2018

1/1/2018

1/1/2018

1/1/2018

1/1/2018

1/1/2018

1/1/2018

1/1/2018

1/1/2018

1/1/2018

1/1/2018

1/1/2018

1/1/2018

1/1/2018

1/1/2018

1/1/2018

1/1/2018

1/1/2018

1/1/2018

1/1/2018

1/1/2018

1/1/2018

1/1/2018

1/1/2018

1/1/2018

1/1/2018

1/1/2018

1/1/2018

1/1/2018

1/1/2018

1/1/2018

1/1/2018

1/1/2018

1/1/2018

1/1/2018

1/1/2018

1/1/2018

1/1/2018

1/1/2018

1/1/2018

1/1/2018

1/1/2018

1/1/2018

1/1/2018

1/1/2018

1/1/2018

